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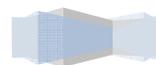
ZIMBABWE RESEARCH INDEX

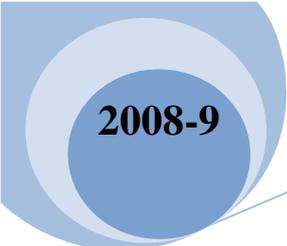
RESEARCH COUNCIL OF ZIMBABWE



Leadership, Innovation and Development

**Research Council of Zimbabwe
P O Box CY294
Causeway
Harare
Zimbabwe**





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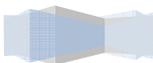
ZIMBABWE RESEARCH INDEX

Zimbabwe Research Index

2008 - 2009

Register of Current Research in Zimbabwe

Compiled by
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Preface

The Zimbabwe Research Index, which is published annually, lists research projects undertaken in Zimbabwe in all fields of science and technology and the humanities.

It is expected that this index will promote collaboration, foster exchange of information and facilitate improved communication within the research community.

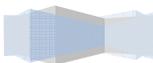
The information contained in this index was obtained through response to a questionnaire sent out to stakeholders. The responses were entered as received except where there were obvious grammatical errors.

Due to the economic challenges Zimbabwe was facing, the index was compiled with minimal resources, hence the limited number of entries. Most of the contributions came from the agricultural sciences sector who responded to the questionnaire. Most institutions were not active during the period of Jan-Dec 2008 and the first quarter of 2009, thus hindering the information gathering.

The RCZ thanks this sector for their contribution and hoping the next issue will cover all fields of science, technology and humanities.

All correspondence regarding this or future editions of the Index should be addressed to:

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USE OF THE INDEX

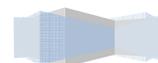
The index is divided into four parts.

1. *Main Section* (pages 1-29). This section lists the research projects in full, in alphabetical sequence of the author's name, with the entry number at the top left hand corner of the entry and the classification number at the top right corner of the entry. The Classification Scheme used to identify the entries is the Library of Congress (LC) Classification Scheme.

2. *Author/Researcher Index*. This lists the names of those people whose projects are included in the main section, followed by the entry number of the project author/researcher.

3. *Subject Index*. Each entry is followed by the appropriate Library of Congress Classification number.

4. *Organisation Index*. This lists the institutions undertaking for research projects, entry numbers for projects and the contact details for the institutions.



**1 HD110 AND
ANDERSSON, J A, TWINE, W., MURWIRA,
A GILLER, K E, MASHINGAIDZE, A B &
SLINGERLAND, M**

Land, productivity and agricultural research:
Towards an understanding of the multiple
meanings of land

University of Zimbabwe

Abstract: In academic and policy thinking, competing claims on land are often viewed in terms of conflicting interests over productive resource use. Within this line of theoretical argumentation tenure security is a prerequisite for increases in productivity, while a lack of it is assumed to be a major impediment to the development of African smallholder agriculture as such farming usually takes place under communal land tenure regimes. This paper challenges this generalized perspective, arguing that the role of agriculture - including its productivity - in the livelihoods of rural people should be understood in relation to other sources of income. Land has different meanings; it is not always the basis of rural livelihoods or a productive resource in which to invest. Land has multiple uses and is valued for both productive and non-productive considerations. Building on empirical material from South Africa and Zimbabwe, it is hypothesized that despite rural peoples' dependency on natural resources and the omnipresence of farming activity in communal areas, few depend centrally on farming for their livelihood. Productivity increases in communal area agriculture are therefore not likely to result from tenure reform alone.

Rather than focusing narrowly on tenure reform and agricultural productivity, agricultural research should adopt a wider perspective on land use, and focus on peoples' land use practices and the different meanings of land in rural livelihoods. Thus, better insight is gained in different stakeholders' - including smallholder farmers' - claims on land, which enable more meaningful scientific contributions to agricultural policy and more productive and/or equitable land-use options.

**2. SH167.T54 BAN
BANDA, F. and CHAZUWA, P**

A study of the effect of green manure on Tilapia production.

Henderson Research Station

Abstract: There is need to establish techniques which can be used in communal areas for fish farming in order to reduce supplementing with expensive feed. This study focuses on the objective

of assessing the utilization of green manure in earth ponds and to compare the effect of fresh and fermented green manure on tilapia production.

**3. S638.5 BAS
BASAL fertilizer and nitrogen combinations for
maximum yield and quality of tobacco**

Tobacco Research Board

Abstract: To evaluate the effect of combining different levels of basal fertilizer and nitrogen side dressings on yield and quality of tobacco.

**4 SB942 BIO
The BIOLOGY of the red and green colour
morphs of the tobacco aphid, myzus nicotianae
on flue-cured tobacco**

Tobacco Research Board

Abstract: To determine and compare the fecundity, longevity and survival of the red and green morphs of the tobacco aphid, *Myzus nicotianae* on flue-cured tobacco

**5. HD2741 BLO
BLOCH, E. & HARRISON, DAVID E.**

Corporate Governance in Zimbabwe

Human Resources Pvt Ltd

Abstract: Management training in Corporate Governance is long overdue in Zimbabwe and would contribute significantly to increased productivity, national economic growth and environmental resource development

**6. RJ206 BUZ
BUZUZI, Stephen**
Community-Based Nutrition Care Programme
(CBNCP) KABP Study / Formative Research
Study

Biomedical Research and Training Institute

Abstract: The study seeks to find out about the existence of practices and interventions which are deemed to provide a comprehensive nutrition package for improved child nutrition and health. The study is to be conducted in six districts from six provinces of Zimbabwe. The specific study sites are, in Bulawayo metropolitan province-Bulawayo City, Harare metropolitan province-Harare City, in the Midlands province-Kwekwe district, in Matabeleland South- Gwanda district, in Manicaland-Mutasa district and Mashonaland Central- Mazoe district.

The study findings will be used to improve the draft the community based nutrition care programme (CBNCP) communication strategy which includes an operational framework that caters for a comprehensive approach aimed at resource mobilisation, political and leadership support, fostering inter-sectoral/agency partnerships and promoting positive nutrition-related behaviours at individual, household and community levels. This will involve the use of the study findings to design new and or to review existing nutrition programmes so that they address the real and identified needs of those who require support and make the greatest impact.

7. SB349 CHA
CHANDIPOSHA, M. MARIMBE, and T. FAMBISAI

Effect of timing and method of trellising on quality and yield of three tomato varieties in the semi-arid region in Zimbabwe.

Abstract: Tomato is an important crop in the world because of its nutritional value, source of income and employment creation. Trellising of tomatoes improve the quality of tomatoes by reducing exposure of fruits to sunlight, reducing disease development giving support to weak stems and trusses of tomatoes. There are different methods of trellising and all have different effect on yield and quality of tomatoes. Delay in trellising has been found to cause root damage, falling of flowers and high susceptibility of stems and fruit trusses to damage. The study investigates how variety affects the quality and yield of tomatoes and determine how the quality and yield of tomatoes is affected by trellising.

8. HV1351 CHA
CHANDIWANA, Brian & MUNYATI, Shungu
 Utilising the PLACE methodology in the development, implementation and evaluation of HIV prevention efforts for the orphan girl child in Zimbabwe

Biomedical Research and Training Institute

Abstract: The ultimate aim of the project is to support families and households and strengthen community based support systems as an indirect means to assist vulnerable children, thereby reducing the socio-economic situations that put young girls at risk of contracting HIV within and outside their homes. This is achieved through the development, implementation, monitoring and evaluation of interventions aimed at changing sexual behavior of orphaned girls, tackling the socio-economic, cultural, environmental/contextual and other factors that promote the sexual vulnerability of the orphaned girl child in the PPAs.

The project focuses special attention on orphaned girls, although the interventions also target OVC in general together with parents/guardians, community support groups (volunteers), and traditional and local authority leaders. These groups are taken aboard into training programs so that service delivery to OVC and their families is enhanced. Particular emphasis is on child-headed households. OVC caregivers play a critical role in assisting OVC and they are also involved in efforts to assist the orphaned girls in various ways. It was the project's aim to target 3000 OVC in each district, with the orphaned girl child constituting three quarters of the direct beneficiaries.

The expected impact of the project, hence the interventions, will be amongst others, low prevalence of HIV amongst orphaned girls, delayed sexual debut, low cases of sexually transmitted infections amongst children, increased numbers of children reporting cases of child abuse, increase in numbers of children seeking VCT services, improved health, development and quality of life of OVC.

9. QK621.P9
CHARACTERISATION of pythium isolates and evaluation of their pathogenicity on tobacco and horticultural crops

Tobacco Research Board

Abstract: To characterise Pythium isolates from the Kutsaga culture collection and to test their pathogenicity on tobacco and horticultural crops and identify isolates to species level.

10. SB951.5 CHI
CHIKEREDE, S. MARONGA, S. MBANGANI
 Evaluation of aqueous plant extracts (Capsicum ssp and Tagees ssp) for the control of antestia bug.

Abstract: Plant extracts could allow preservation of natural enemies that keep down levels of pest attack. They can also provide insights for development of natural and synthetic insecticides. Furthermore, botanicals are convenient to the smallholders since they are cheaper to extract and use other than chemical insecticides requiring foreign currency to purchase them. The objective is to evaluate the insecticidal activity of plant extracts against antestia bug in coffee.

11. SB951.5 CHI
CHIKEREDE, S. MARONGA, S. MBANGANI, M.B.

Evaluation of insecticides for the control of white grubs and other soil pests.

Coffee Research Station/Mooiplaats Watt

Abstract: White grubs and other soil pests were formerly controlled by application of organochlorine insecticides such as aldrin and dieldrin. These have now been banned because of their environmental persistence and effects on non-target organisms. Therefore there is need to evaluate the efficacy of alternatives to aldrin for control of white grubs, which are major pest problems in establishing crops. White grubs are polyphagous such that the same species affecting wattle and beans also occur in coffee.

12 TX558.B7 CHI
CHIKEREMA, Melody

Effect of diastase sorghum malt on whole wheat bread quality.

Masvingo Polytechnic, National University of Science and Technology

Abstract: This study sought to investigate the impact of sorghum malt on whole wheat bread quality. The purpose of this study was to investigate the effect of sorghum malt on whole wheat bread volume, bread texture and bread flavor. The five samples of whole wheat bread A,B,C,D and E were produced with the all the ingredients the same except for sorghum malt which was added as 0% , 1% , 2% , 3% and 4% respectively. The bread samples were analyzed for bread volume using a method by the RACI (1995). Bread texture and bread flavor were analyzed using sensory evaluation. The data for sensory evaluation was analyzed using the significant level of 0.05%.

There was a significant increase in bread volume and an improvement in bread texture and bread flavor when sorghum malt was added to whole wheat dough. 2% sorghum malt was established as the optimum level of malt which can be added to wheat dough to give the optimum improvement in bread quality. It can also be concluded that increasing malt above the optimum level can result in bread of poor texture. The effect of tannin level in the sorghum grains is used in the production of malt for bread production on the amylase activity in sorghum can be further researched upon

13. SB119
CHICHIKUMBA, N, MANYAWU, G J,
POSHIWA, X and CHAKOMA, I

The Effect of seed treatment on the germination of *Macrotyloma daltonii*.

Grasslands Research Station

Abstract: Seed of *macrotyloma daltonii* was collected from the wild by staff. The legume demonstrated outstanding growth in the area. The species was evaluated to assess its forage production potential, biological nitrogen fixation and nutritive value since the species is not currently used in sown pastures.

14 SB269 CHI
CHINGWARA, V., MAHOYA, C., CHEMURA,
A., & MANDLAZI, R

Evaluation of dwarf coffee varieties, Catimor F6 and Catimor 129 under organic fertilization and different planting hole sizes.

Coffee Research Station

Abstract: Dwarf varieties have been evaluated locally under high fertilizer levels but recent farmer practices and research work has shown good response to integrated soil fertility management practices. The objectives of the study are to come up with recommendations for smallholder farmers that will combine sustainable soil fertility and water conservation practices.

15 LB3061 CHI
CHINYOKA, Kudzai

Streaming and Academic performance: The views and reactions of Secondary school pupils.

Great Zimbabwe University

Abstract: The controversy whether streaming facilities efficiency in learning and teaching has attracted widespread attention and research. In Zimbabwe and indeed many other countries in Southern Africa streaming has been a much used and sometimes misused approach in meeting the diverse needs of pupils. This study, therefore examined effects of streaming on pupils' academic performance in four Masvingo urban schools. The qualitative design was adopted for use in this study and data was collected using questionnaires, observation checklists and interviews. This study established that there is a direct and positive correlation between placement in high ability classes and high performance and also placement in low ability classes and low performance. Low ability pupils were deprived of the examples and stimulation provided to high achievers. The results of this study revealed that low ability pupils received low quality instruction, less textbooks, less attention from teachers and were also taught by negatively labelled teachers, temporary and student teachers. On the contrary, high ability classes were labelled positively, received maximum support from teachers and were taught by more experienced teachers. The initial differences between pupils in high ability and low ability classes were however exacerbated by streaming. Subsequently, in the

way forward, the research study proposed that heterogeneous grouping be adopted, that schools allocate experienced and positively labelled teachers to low ability classes and that teacher should use positive labels and comments to stimulate interest among pupils at the same time building pupils' self concepts.

16 **SB359.5 CHI**
CHITAKUNYE, T.J., and MUNIKWA, W.

Effect of different pruning techniques under high plant density on mangoes.

Abstract: There is lack of information on canopy management under high density planting. There is need for more efficient application of nutrients, pesticides, foliar sprays and safe and more efficient harvest and access of equipment and personnel in the orchards. This study focuses on the assessment of the effect of different pruning and training and high density planning on fruit size and yield on the mango cultivar Haden. It will also focus on the improvement in production of high quality fruits by more efficient harvest.

17 **SB359.5 CHI**
CHITAKUNYE Tapiwa J

Effect of different pruning techniques under high density on fruit yield and size on the mango cultivar harden

Chiredzi Research Institute

Abstract: The yield of mango is dependant on cultivar and the number of plants per unit area. The traditional mango spacing is 10m x 10m. This spacing results in low returns during the early years of crop growth before the full canopy stage and the trees become so big that it is difficult to harvest. Over the past few years, farmers have started adapting high density planting techniques. There is lack of local information on canopy management under high density planting. There is potential for implementing pruning and training techniques that will allow the high density stands to be maintained throughout the life span of the crop. Trees were spaced at 5m between rows and 4 m within rows. Treatments were effected from the third year of planting in a randomized complete block design with three replications and three treatments. The treatment was box pruning spherical and the central leader method which acted as the control. Pruning operations were done in February soon after the last harvest. The treatments started to be effected in 2006. Records taken were days to 50 % flowering, weight of marketable fruits, weight of non marketable fruits, number of marketable and number of non marketable fruits. The first results were collected in the 2006-2007 season. In the 2008-2009 season there was a strong wind when

the fruits were pea size. That wind caused heavy fruit drop. In 2009 the tress were showing nutritional stress and water stress symptoms. No conclusion can be drawn from the results collected so far. At least three more seasons are needed to draw conclusions. Management also needs to be intensified so that the trees can express their potential by timeliness of operations. Which include pruning, irrigation and fertilization at the right time. in the previous seasons resources were limited some operations were not done, therefore affecting the results severely.

18 **SB379.G8 CHI**
CHITAKUNYE, T.J., and MUNIKWA, W.

Guava line evaluation.

Abstract: The main objective of the study is to accumulate data on the growth and performance of indigenous guava lines and to develop guava as a commercial crop for the fresh market, canning and processing.

19 **SB379.G8 CHI**
CHITAKUNYE Tapiwa J

Guava line evaluation

Chiredzi Research Institute

Abstract: The guava is an important fruit throughout the tropics and has become naturalized in many areas. The fruit is very high in Vitamin C and is a rich source of vitamin A. The plant grows well in some parts of Zimbabwe. Initial selection of indigenous guavas was done in Chipinge in 1993. Several lines were selected for evaluation at Chiredzi Research station. From the evaluation fifteen lines were recommended for further evaluation. A commercial variety from South Africa (Piet retief) was incorporated in the evaluation as the control. The trees were planted in randomized complete block design replicated three times. Plants are spaced at 3m between rows and 3m within the rows. Each plot consists of one tree. Measurements taken were trunk girth, canopy diameter, tree height, number of branches, number of marketable fruits/tree and marketable fruit yield. From 2005 to 2008 lines 15, 9, 2, 13, and 16 consistently gave the highest yields. All the red lines were high yielding. They were rated as sour except for line 2 and Piet Retief. The white lines, line 3, 12, 14, 4 and 10 also consistently gave the lowest yields. The yield per tree for all the lines did not show any trend due to poor management in 2007, 2008 and 2009. In 2006 the red lines showed significantly high yield compared to the white lines. The yields were significantly higher ($P < 0.05$) than Piet Retief. Line 2 is a promising line among the red lines for fresh market. It is a high yielder and has a good taste. While line 9 and 15

can be selected for processing they are very high yielding but not suitable for the fresh market due to the sour taste. Among the white lines, line 6 and 7 are promising lines. Further selection and characterization should continue and recommendations should also be made on the basis of fruit quality analysis and relative tolerance to fruit fly and acceptability by consumers.

20 **SF511 CHI**
CHIVANDI, E, SIBANDA, B M and MASAKA, J

Dietary effects of optizyme P5[®] on the growth performance of day-old struthio camelus var. demesticus (ostrich) chicks

Midlands State University

Abstract: The effect of Optizyme P5 inclusion in ostrich chick starter diets on the growth performance of day old ostrich chicks was investigated. Seven hundred day old ostrich chicks with mean weight of 0.82 ± 0.11 kg were used. The chicks were split into two groups. Group one was on the control ostrich chick starter diet (D1) while group two had the exogenous enzyme complex included at a rate of 0.1% (in its diet (D2)). Each treatment was replicated 7times. Each replicate of 50 chicks constituted an experimental unit. Pens were used as a blocking factor in a Randomized Complete Block Design. Chick growth performance was monitored for 49days. Dietary fortification with the exogenous enzyme did not affect ($p > 0.05$) live weight gain and average daily gain of the ostrich chicks (6.45 0.45kg and 131.7 9.20g/Day and 6.28 0.60kg and 128.20 12.50g/Day for chicks on D1 and D2 respectively). Birds offered exogenous enzyme fortified diet consumed significantly less ($p < 0.001$) feed with a mean Dry Matter Intake (DMI) of 9.52 0.99kg versus the 10.86 0.90kg for those on the control diet. Efficiency of feed utilization was significantly high ($p < 0.001$) for birds on diet D2 with a feed conversion ratio (FCR) of 1.52 0.1 versus an FRC of 1.68 0.11 for birds on the control diet. Dietary fortification of ostrich chick starter diet with Optizyme P5 improves feed utilization efficiency.

21 **SD387.R4 CHI**
CHIVHENG EMMERSON

Remotely sensing carbon stocks in dry forests in Southern Africa

University of Zimbabwe

Abstract: Forests contain about 80% of global terrestrial aboveground carbon stocks and 40% of all below-ground terrestrial organic carbon (IPCC 2006; Baccini and Larporte, 2008; Samalca and de Gier, 2007). Concerns over global problems

induced by the rise of atmospheric carbon dioxide levels has prompted attention on the role of forests as carbon storages and regulating the global climate system and the negative effects of climate change (Houghton 2005). According to the IPCC 4th Assessment, the world will experience a predicted increase in temperature from 1.8^oC to 4^oC at the end of the century and this has been linked to increases of carbon dioxide in the atmosphere (IPCC 2007). Thus, forests conservation could be an important part of the mitigation strategy. This is recognized under reduced emissions from deforestation and degradation (REDD) that requires accurate estimates of carbon stock in developing countries for carbon credit allocation based on carbon stock baselines (Baccini and Larporte, 2008). Climate change is a direct result of increases in the concentration of greenhouse gases in the atmosphere especially carbon dioxide which constitutes 72% of greenhouse gases (Samalca and de Gier, 2007). In this regard forest conservation would result in enhanced carbon sequestration capacity thereby mitigating the problem of climate change.

Thus this study will be carried out in the dry forests of Zimbabwe, Zambia, Tanzania, Botswana, Mozambique, Swaziland, Lesotho, Malawi and Kenya in permanent plots established from previous studies. Thus, this study aims to test whether the relationship between remote sensing and ground- based measurements can be exploited for the purpose of estimating carbon stocks in the dry forests of Southern Africa

22 **RM868.5 CHI**
CHIYAKA, Christinah, GARIRA, Winston AND DUBE, Shadreck

Effects of treatment and drug resistance on the transmission dynamics of malaria in endemic areas (2009)

National University of Science and Technology

Abstract: We present a mathematical model for malaria treatment and spread of drug resistance in an endemic population. The model considers treated humans that remain infectious for some time and partially immune humans who are also infectious to mosquitoes although their infectiousness is always less than their non immune counterparts. The model is formulated by considering delays in the latent periods in both mosquito and human populations and in the period within which partial immunity is lost. Qualitative analysis of the model including positivity and boundedness of solutions is performed. Analysis of the reproductive numbers shows that if the treated humans become immediately uninfected to mosquitoes then treatment will always reduce the number of

sensitive infections. If however treated humans are infectious then for treatment to effectively reduce the number of sensitive infections, the ratio of the infectious period of the treated humans to the infectious period of the untreated humans multiplied by the ratio of the transmission rate from a treated human to the transmission rate of an untreated human should

be less than one. Our results show that the spread of drug resistance with treatment as a control strategy depends on the ratio of the infectious periods of treated and untreated humans and on the transmission rates from infectious humans with resistant and sensitive infections. Numerical analysis is performed to assess the effects of treatment on the spread of resistance and infection. The study provides insight into the possible intervention strategies to be employed in malaria endemic populations with resistant parasites by identifying important parameters.

23 **RA641.B5 CHI**

CHIYAKA, E. and GARIRA, W.

Mathematical analysis of the transmission Dynamics of schistosomiasis in the human-snail hosts

National University of Science and Technology

Abstract: The spread and persistence of schistosomiasis are some of the more complex host parasite processes to model mathematically because of the different larval forms assumed by the parasite and the requirement of two hosts during the life cycle. We construct a deterministic mathematical model to study the transmission dynamics of schistosomiasis where the miracidia and cercariae dynamics are incorporated. The model is analyzed to gain insights into the qualitative features of the equilibrium which allows the determination of the basic reproductive number. Conditions for existence of the endemic equilibrium are discussed and its local stability is determined using the Center Manifold Theory. Analytical and numerical techniques are employed to assess the conditions of containment and persistence of schistosomiasis. Our results show that control strategies that target the transmission of the disease from the snail to man will be more effective in the control of the disease than those that block the transmission from man to snail.

24 **SB276 CLA** **CLASSIFICATION and pathogenicity of new pseudomonas syringae pv. tabaci tox+ and tox- isolates**

Tobacco Research Board

Abstract: To verify the race classification of new *Pseudomonas syringae* pv. *tabaci* Tox+ and Tox- isolates and test their pathogenicity on the four tobacco indicator cultivars.

25 **SB998.M45 CLI** **CLIMATE change trial -nematode composition and population in tobacco growing lands at kutsaga in the presence of tobacco cultivars resistant to meloidogyne javanica**

Tobacco Research Board

Abstract: To assess the composition and abundance of nematode species in the presence of tobacco cultivars resistant to *M. javanica*

26 **SB276 CLI** **CLIMATIC change trial - analysis of data on nuclear counts and soreshin severity collected from crops included in the rotation trials and correlation of data with climatic variables**

Tobacco Research Board

Abstract: To establish if there is a relationship between the incidence and severity of soreshin levels on tobacco and other crops included in the rotation trials 1991-2006 and the changes in climate.

27 **SB608.T7 CLI** **CLIMATIC change trial : compilation and analysis of coresta collaborative trial data on pvv, bushytop and other viruses**

Tobacco Research Board

Abstract: To establish if there is a relationship between the incidence and severity of virus diseases on tobacco and the prevailing climate

28 **SB951.3CLI** **CLIMATIC change trial - evaluation of the pb ct tobacco cultivars for resistance to economically important diseases and pests**

Tobacco Research Board

Abstract: To evaluate the open, limited and rationed release and PABT tobacco cultivars for their resistance to economically important pests and diseases (e.g. PVY and any other viruses, *Alternaria* leaf spot, Angular leaf spot, and frog-eye).

To monitor the varieties for disease incidences and severity and correlate with climate data.

29 **RA644.T7 COR**
CORBETT, ELIZABETH & MUNGOFA,
STANLEY

A cluster-randomized trial of two intensified TB case-finding strategies in an urban community severely affected by HIV

Biomedical Research and Training Institute

Abstract: Undiagnosed TB can remain infectious for prolonged periods and is the main source of ongoing TB transmission in the community. On average, one person with TB will infect only about 10 others per year spent with untreated smear-positive disease, but with prolonged infectiousness before diagnosis (mean of 2 years globally) keeping the number of secondary infections high enough to maintain the transmission cycle. In Africa, adult HIV prevalence was the strongest predictor of National TB case-notification rates by the beginning of this decade but relatively little of the burden of undiagnosed infectious TB in the community is attributable to HIV, because of a much briefer mean period of smear-positivity. The implications are that, on average, each HIV-negative TB patient contributes far more to TB transmission than each HIV-positive TB patients (having a longer infectious period in which to transmit) and that the brief infectiousness of HIV-related TB is likely to mitigate the impact of the HIV-related TB epidemic on overall community TB transmission rates. This is in keeping with TB transmission data from Africa showing no major impact from the HIV epidemic.

Current international policy concerning TB control in HIV prevalent settings does not promote community-based case-finding, but instead is based on DOTS (prompt investigation and effective treatment of smear-positive TB in patients reporting chronic cough to health facilities), with promotion of additional interventions for individuals known to be HIV-positive, including active case-finding and joint HIV/TB care. Although interventions targeted to known HIV-infected persons are necessary for HIV care, their contribution towards control of TB transmission may be limited because: -

HIV-related TB usually presents before HIV has been diagnosed, limiting the population-level impact of interventions at or after the time of HIV-testing, and

Including HIV-negative individuals is necessary as they are likely to be responsible for most TB transmission events, even in high HIV prevalence populations, due to their prolonged infectiousness

Periodic community-based case-finding was widely used in industrialized countries and parts of Asia during the last century, but was not widely

evaluated for impact on prevalent TB. The aims of this study were:

To compare the cumulative yield and residual burden of two potentially sustainable intensified TB case-finding methods applied once every 6 months for 6 rounds in a high HIV prevalence setting Household enquiry for chronic coughers, and Promotion of self-reporting of chronic cough to a mobile diagnostic unit.

To investigate point prevalence and incidence of active TB disease before and after the intervention period, stratified by HIV status

To develop dynamic mathematical models in order to explore further the impact of HIV and the likely efficacy of strategies for improving TB control in high HIV prevalence areas

30 **SB608.T7 COR**
CORESTA virus diseases collaborative
experiment

Tobacco Research Board

Abstract: To study sources of PVY resistance and get a better knowledge of PVY strains distribution (especially necrotic strains) on Zimbabwean and CORESTA prescribed cultivars.

31 **SB998.M45 DET**
DETERMINATION of damage functions for
meloidogyne javanica on Kutsaga varieties and
breeding lines

Tobacco Research Board

Abstract: To determine the damage functions for *M. javanica* on Kutsaga breeding lines and varieties.

32 **SF511 DUB**
DUBE, S. MWENJE, E. AND KAMBASA, E.
Studies of the Effects on Ostrich Growth, of Silage,
Altering Feed Levels and Some Nutritional
Supplements in Feed (2009)

National University of Science and Technology

Abstract: In this study we tested the effect of altering ostrich feed, by adding silage to feed in the ratio 2:1, by reducing feed levels to 90% and 75%, by adding antimicrobial growth promoter Zinc bacitracin and flavoumycin and presenting probiotics as liquid and powder. For each trial a control was set up with only normal prescribed feed supplied. All the birds used were health kept under high hygiene and vaccinated and dewormed to remove interference from pathogens. The results indicated that silage improved palatability and food intake. Reducing feed levels did not significantly alter the FCR or the performance of the birds.

promoters increased FCR but mortality was high. Probiotics were more effective when presented in liquid form than powder. The results show that data on effectiveness of feed supplements should be extrapolated to ostriches with caution.

33 **SF498.7 DUB**
DUBE, S, MWENJE, E., GORA, K AND C. DUBE, C

Studies on the effects of reducing the period of using starter mesh and application of probiotics to broiler chickens (2009).

National University of Science and Technology

Abstract: Two sets of 150 day old broiler chickens were fed with starter mesh for 14 and 21 days respectively and there after given grower mesh until day 35 after which both were fed on finisher until day 42. There was no significant difference in the final carcass mass of both ($p>0.05$). Another trial was set up to investigate the effect of application of probiotics as liquid and as powder on 2500 birds per treatment and a control with no probiotics was also set up. The results showed that probiotics applied as liquid had the best effect on PEF and FCR. The experiment to determine the best time to apply probiotics was conducted on 2000 birds per treatment. The results showed that the best performance was obtained when application of probiotics was started at 14 days The PEF was also highest on birds which started probiotics on day 14.

34 **S631 EFF**
EFFECT of foliar15 on tobacco growth, yield and quality

Tobacco Research Board

Abstract: To determine the efficacy of Foliar15 in enhancing growth, yield and quality of tobacco

35 **S631 EFF**
EFFECT of nitrogen (n) on striga seed germination and stimulant production

Tobacco Research Board

Abstract: To determine the effect of Nitrogen on Striga seed germination and stimulant production

36 **SB273 EVA**
EFFECT of tobacco seedling production system on early flowering in four flue cured tobacco varieties

Tobacco Research Board

Abstract: To compare the effects of seedling production system on flowering of tobacco varieties

37 **SB741.R7 EFF**
EFFECTIVENESS of ethoprophos 15g and 400cs applied in the planting hole for the control of root-knot nematodes in tobacco lands

Tobacco Research Board

Abstract: To assess the effectiveness of ethoprophos applied, on its own, in the planting hole, for the control of root-knot nematodes in tobacco lands

38 **S651 EFF**
EFFECTS of an extended hardening period and extra nitrogen on Tobacco flowering in the float seedling production system

Tobacco Research Board

Abstract: To evaluate the effect of Nitrogen application after 70 days on flowering of tobacco crops established from float system seedlings.

39 **SB945.A5 EVA**
EVALUATION of a habitat management system for the tobacco aphid

Tobacco Research Board

Abstract: To study the incidence of aphids in a monocrop of a non-hairy tobacco variety and intercrops of non-hairy and hairy tobacco.

40 **SB945.A2 EVA**
EVALUATION of aphicides from new sources for the management of the tobacco aphid to evaluate aphicides from new sources for the management of the tobacco aphid

Tobacco Research Board

41 **SB952.B4 EVA**
EVALUATION of benomyl and iprodione from a new source for the management of frog-eye in the field

Tobacco Research Board

Abstract: To evaluate benomyl and iprodione from a new source for the management of frog-eye in the field

42 **S951 EVA**
EVALUATION of bactericides from new sources for the management of

wildfire and angular leaf spot in tobacco seedbeds

Tobacco Research Board

Abstract: To evaluate bactericides from new sources for wildfire and angular leaf spot control**43 SB951.3 EVA
EVALUATION of fungicides from a new source for alternaria management in the seedbed**

Tobacco Research Board

Abstract: To evaluate mancozeb from a new source for the management of Alternaria stem lesions in tobacco seedlings.**44 SB951.5 EVA
EVALUATION of insecticides from new sources for cutworm control**

Tobacco Research Board

Abstract: To determine the efficacy of a new insecticide formulation for cutworm control**45 SB951.5 EVA
EVALUATION of metalaxyl from a new source for the management of black shank**

Tobacco Research Board

Abstract: To evaluate the fungicide metalaxyl, from a new source for black shank control**46 SB945.A5 EVA
EVALUATION of new aphicide formulations for the management of the tobacco aphid in floatbeds**

Tobacco Research Board

Abstract: To evaluate the efficacy of new formulations of aphicides for aphid management in the floatbed system.**47 SB951.5 EVA
EVALUATION of new insecticides (flubendiamide and imidacloprid+β- cyfluthrin) for budworm control**

Tobacco Research Board

Abstract: To evaluate the efficacy of Flubendiamide and imidacloprid + β-cyfluthrin for budworm control**48 SB942 EVA
EVALUATION of the compatibility of triadimenol (baytan) and aphicides applied simultaneously at two days before planting.**

Tobacco Research Board

Abstract: To evaluate the compatibility of two systemic aphicides, imidacloprid and thiamethoxam (Actara®) and the fungicide triadimenol (Baytan®) applied in the floatbed for subsequent pest management in the field.**49 SB951.3 EVA
EVALUATION of the efficacy of new fungicides for soreshin control in the field**

Tobacco Research Board

Abstract: To evaluate fungicides from new sources for soreshin control in the field**50 SB951.5 EVA
EVALUATION of new insecticide formulations for the management of cutworm in floatbeds**

Tobacco Research Board

Abstract: To evaluate the efficacy of cutworm control pesticides from new sources**51 SB608.T7 EVA
EVALUATION of the efficacy of trichoderma incorporated into soil in the seedbeds for the management of soreshin in the field**

Tobacco Research Board

Abstract: To evaluate Trichoderma harzianum for the management of Rhizoctonia solani diseases in tobacco.**52 QK625.D4 EVA
EVALUATION of the pathogenicity of cercospora spp. on bells of Ireland (molucella laevis)**

Tobacco Research Board

Abstract: To evaluate the pathogenicity of Cercospora spp on Molucella laevis**53 SB608.T7 EVA
EVALUATION of the plant health regulator 'messenger' for yield improvement and disease control in tobacco**

Tobacco Research Board

Abstract: To evaluate a Plant Health regulator 'Messenger' for its potential to increase tobacco yields (10PP10K1) and confer disease control (10PP10K2).

**54 SB741.A48 EVA
EVALUATION of tebuconazole and iprodione
from a new source for the
management of alternaria leaf spot in the field**

Tobacco Research Board

Abstract: To evaluate tebuconazole and iprodione from a new source for the management of Alternaria leaf spot in the field

**55 QK625.D4 EXP
EXPLORATION for effective fungicides for the
management of cercospora spp. on bells of
Ireland (molucella laevis)**

Tobacco Research Board

Abstract: To evaluate the efficacy of seven fungicides for the management of Cercospora leaf spot on Bells of Ireland

**56 RA644.A25 FER
FERRAND, Rashida & BANDASON, Tsitsi
Child Aid**

Biomedical research and Training Institute

Abstract: It is anticipated that that between 1-3% of older children will be living with HIV acquired through MTCT in Zimbabwe by 2010 and this is likely to have a significant impact on adolescent health. An HIV epidemic among older children is already very prominent in Zimbabwe: our recent study shows that almost 50% of children aged between 10 to 18 years presenting to the two central hospitals in Harare are HIV-infected, the majority of whom present with advanced HIV disease, and have a case-fatality rate of up to 20%. There are however, very few empiric data on burden of HIV among older children and these are urgently required to guide policy and service provision.

Late diagnosis is a prominent feature of HIV in older children leading to a high burden of irreversible chronic consequences of HIV. Diagnosis is often delayed until life-threatening opportunistic infections occur. Prominent features common to these HIV-infected children include: high prevalence of orphanhood, history of sick/dead siblings, short stature, skin disease, long history of minor illnesses and frequent absenteeism from school as a result of ill-health with consequent failure to attain fundamental educational skills.

Older children may be unable to access HIV testing services because of their poor social circumstances, limited personal resources, their inexperience and legal restrictions. Current antiretroviral therapy (ART) access initiatives also tend to exclude older children from priority groups for ART. Many of these vertically-infected older children will be orphaned and therefore even less likely to be successful in accessing health services, as illustrated by the 2004/5 UNICEF survey on orphans and other vulnerable children (OVC).

Thus without specific targeting, they are unlikely to succeed in accessing HIV diagnosis and care services. There are few existing empirical data on the burden of HIV among older children. Quantification of the HIV burden in primary schools will help understanding of magnitude of the emerging HIV epidemic among older children. Such data are critical to inform planning of appropriate HIV diagnostic and care services for this age-group.

The objectives are:

To quantify HIV prevalence in primary schools with age-group trends

To develop a case-definition of an HIV suspect based on simple indicators (e.g. height, frequent absenteeism, orphanhood status, skin problems), with indications of sensitivity and specificity

To determine the number of HIV diagnoses made through the PSI CT service

**57 HD9743.A4.B69 GAN
GANDURE, Jerekias AND MHLANGA,
Samson**

Manufacturing Strategy - a Potential Competitive Tool for J&S Botswana (Pty) Ltd [Case Study] (2009).

National University of Science and Technology

Abstract: It is quite common a practice for organizations in developing countries with manufacturing functions, particularly small to medium enterprises, to operate without a defined strategy for competitiveness. This has seen many potential businesses failing to survive the competition in the dynamic business environment. In order to thrive in any chosen market, an organization needs to have a well-defined manufacturing strategy that is periodically audited. An effective manufacturing strategy must clarify and define the links between overall competitive strategy and the development of the company's resources. Strategy formulation provides direction, purpose and coherence; ensures that manufacturing's interests are taken into account at corporate level; clarifies and emphasizes priorities and potential conflicts; and helps integrate functions. An understanding of the consumer's

needs is critical and a clear awareness of order winning and order qualifying criteria is essential. Thus a manufacturing strategy sets the destination (and course), and implementation of the same defines how to get there. This work therefore outlines a customized methodology for formulating a manufacturing strategy through a strategic audit of a local case study company. The results of the audit carried out indicate that the company is operating without a defined strategy for competitiveness and is performing very badly with respect to the desired levels of competitive performance objectives. Suggestions are made for the effective implementation of a performance improvement programme within the context of the company's current limitations.

58 **JV9007.2 GAN**
GANDURE, J and MHLANGA, S

Performance analysis of immigration operation by discrete event modelling and simulation (2009)

National University of Science and Technology

Abstract: Discrete event modelling and simulation were used to analyse the performance of immigration operation in Botswana. The relationships between length of queues of immigrants, queuing time, service time and engagement of duty officer were investigated. Data collected by direct observation and clock-timing of processing immigrant request at an inland office on a normal working day was used to determine whether to increase or reduce the number of serving officers to balance the operations. The findings indicated that the system of operation was balanced or fairly matched by 75 % utilization of the officer, average immigrant queuing time of 4.2 min, and required no changes. The pilot study could be replicated at other boarder posts and airports prior to the expected influx of tourists during the 2010 World Cup Football Competition in South Africa.

59 **RC311.4 GAN**
GANGAIDZO, Innocent T. & MATAMBO, Ronnie

To compare treatment outcomes and early relapse rates of the standard 6-month regimen with two alternative treatment regimens for the treatment of tuberculosis, using an open-label 3-arm clinical trial. If shown to be as effective, the trial regimens have potential to replace currently recommended first-line regimens for patients with TB in resource-poor settings, since they are less onerous to take and supervise.

Biomedical Research and Training Institute

Abstract: An International Multicentre Controlled Clinical Trial to Evaluate High Dose Rifapentine and a Quinolone in the Treatment of Pulmonary Tuberculosis (RIFAQUIN)

Tuberculosis and HIV are two of three major diseases in the developing world; the incidence of new cases of tuberculosis has increased dramatically in recent years, due in large part, to co-infection with HIV. Effective short course regimens of chemotherapy for the treatment of pulmonary tuberculosis have been evaluated in numerous controlled trials worldwide. These are currently 6-8 months in duration. When adequately administered, they are capable of cure rates (defined here as bacteriological cure at the end of treatment and no early relapse) of 95% or more in patients with drug sensitive organisms.

The objective is to investigate the potential of two FDA approved drugs, rifapentine (a rifamycin from the same class of compounds as rifampicin) and moxifloxacin (a fluoroquinolone), to allow intermittent doses in the continuation phase and/or treatment shortening while retaining satisfactory treatment outcomes and preventing the emergence of rifamycin mono-resistance. Rifamycin mono-resistance is a particular concern for patients with HIV-related TB, since early relapse with rifampicin mono-resistance was observed among 6 or 30 HIV-positive participants in an American trial of once weekly rifapentine (600 mg) plus isoniazid in the continuation phase. Each relapsing patient had late-stage HIV infection, low CD4 counts and documented co-administration of antifungal azoles. Resistance to rifapentine results in cross-resistance to rifampicin. Ability to prevent the emergence of drug resistance is an essential attribute of TB treatment regimens and so, even at low rate, would preclude further consideration of our trial regimens.

60 **QL737.U5 GAV**
GAVERA, M.F., NKOMBONI, G., SISITO, G., NGOMA, D., MUSARIRA, M., KUFA, M., TAVARERA, S.

Utilization of urea and indigenous chicken manure in improving the quality of sorghum and millet stover for use as supplementary feed for small ruminants.

Abstract: Crop production in natural regions 4 and 5 is limited to drought tolerant crops like sorghum and millet. The use of their stover as stock feed has not been evaluated as main experimental work is concentrated on maize stover utilization. The accessibility of urea for stover treatment may be a limiting factor to stover utilization therefore the use of indigenous poultry manure is being evaluated. The objectives of study are (i) to improve the nutritional composition of crop residues for use as feed for small ruminants; (ii) to evaluate dry matter intake by ruminants after treatment; (iii) to

determine faecal levels of calcium and phosphorous after treatment and (iv) to determine the optimum inclusive levels of urea and poultry manure in treating millet and sorghum stover.

61 **SB363.3 GOK**
GOKOMA, Bongayi

Apple cultivar evaluation trial.

Horticultural Research Centre

Abstract: Growers are always interested in finding apples with superior quality, high yields, and better adaptation to local climatic conditions, more appropriate ripening dates, pests and disease resistance for local and foreign markets. It is important to introduce promising cultivars from abroad and select the best and demonstrate their superiority. The main objective of the study is to identify new cultivars that would give high yield potential excellent fruit quality, better adaptation to local conditions as well as a high degree of tolerance to pest and disease for purposes of giving recommendations to farmers.

62 **SB373 GOK**
GOKOMA, Bongayi

Effect of Different Compound J9N.P.K. 15.5.20) Levels On cropping Pears.

Horticultural Research Station

Abstract: The elementary nutrient requirements for pears have not been much documented and a lot of blanket recommendations have been used in the past. While soil analysis is the key to plant nutrition requirements, most poor resource farmers have been unable to send their soils for analysis, while research has not done enough to give them appropriate recommendations. A trial was set out to try different levels of compound J (NPK 15.5.20) a traditional fertiliser in fruit tress production with the aim of giving out better recommendations to pear growing farmers in Zimbabwe.

63 **SB363.3 GOK**
GOKOMA, Bongayi

The Effect of planting density on the field and productivity of four Israeli apple cultivars (Anna, Ellah, Mayan and Michel)

Horticultural Research Station

Abstract: Bergh (1991) noted that the optimum plant density for apple trees is 1250-1667 trees a hectare at a planting distance of 4 x 2m – 4 x 1.5m. Tree densities below this range do not produce enough tonnage, particularly during the first few years after established, to warrant the additional tree costs. Tree densities above this do not warrant

the additional tree costs and the more intensive management required for such a high density orchard. However, at HRC these four cultivars have been evaluated at 4m x 4m spacing, which seem to be too wide considering the tree canopy growth obtained so far, hence closer spacing are now being evaluated. The main objectives of the study is to assess the performance of four Israeli apple cultivars grafted on semi dwarfing rootstock (MM106) in high density plantings and to identify the best optimum density for apples grafted on semi dwarfing rootstock that would give high yield potential, excellent fruit quality, better adaptation to local conditions as well as a high degree of tolerance to pest and diseases for the purpose of giving recommendations to the farmers.

64 **SB363.3.Z56 GOK**
GOKOMA, Bongayi

Low chill apple cultivar Trial.

Horticultural Research Station

Abstract: Marondera has been considered as an area too low and too warm for apple production. With breeding of low chilling requirement apple cultivars, a trial was set up so as to evaluate such cultivars in Marondera so as to assess their adaptability and disease resistance while at the same time evaluating consumer acceptance.

65 **SB377 GOK**
GOKOMA, Bongayi

Plum fruit tree nursery phase reduction trial.

Horticultural Research Centre

Abstract: The current and conventional way of producing grafted plum trees involves the rooting of Marianna in the first season, then allowing it to root and to develop shoots for the entire year. After one year, the desirable cultivar is then grafted on the new shoots from the rooted cutting and these will be one year old. This has been so because the establishment of cutting is usually associated with the utilisation of carbohydrate reserves in the Marianna cutting and excessive root production exhaust the carbohydrate resource in the leafless cutting (Carlson 1987). This has prompted the grafted tree to be kept in the nursery for another year. It means therefore, that a grafted plum fruit tree can only be availed to the farmer after two years, of which all these will have been spent in the nursery. There is need therefore to try and find out the possible economic ways of reducing this period under which the fruit trees take while in the nursery. This will not only help to avail fruit plants to the farmer in a shorter time frame, but also to reduce the handling costs of the fruit trees.

66**GOKOMA, Bongayi**

Stone fruit evaluation trial.

SB378 GOK

Horticultural Research Centre

Abstract: As new deciduous cultivars are introduced into the warmer growing areas of Zimbabwe, there is need to continue to evaluate their performance basing on the standard varieties. The cultivars need to be categorized into their respective maturity groups, whether early, medium and late varieties. However, with new introductions such distinctions are no longer clearly defined to the deciduous tree farmer, and farmers are not aware of the cultivars that perform optimally in their growing areas. Farmers are also unaware of the picking times of these new introductions, thus the need to categorize them.

67**GREGSON, Simon & NYAMUKAPA, Constance**

Manicaland HIV/STD Prevention Project

RA644.A25 GRE

Biomedical Research and Training Institute

Abstract: HIV epidemics are long-term phenomena extending over timescales of several decades. Thus, there is a continuing need to monitor the spread of HIV, the socio-demographic impact of AIDS and the effectiveness of control programmes. In countries with widely disseminated epidemics, this can be done best through open population-based cohort surveys that track levels of HIV infection, morbidity, mortality etc. in individuals living in households in the general community. However, the complexity and cost of these studies is such that only a handful is being conducted worldwide. The Manicaland Project is the only study of this kind in Zimbabwe.

Against this background, the principal objectives of the Manicaland Project are:

To measure trends in HIV prevalence, HIV incidence, AIDS mortality and the wider socio-demographic impact in a general population sample in eastern Zimbabwe

To describe key determinants in the spread and impact of HIV/AIDS

To provide data on trends in coverage and on the effectiveness of HIV prevention, treatment and impact mitigation strategies - including estimates of current and potential future population-level impact derived by fitting mathematical models to local data

To disseminate the research findings at international, national and local levels and contribute to their utilisation in the formulation and implementation of policy

To contribute to building local capacity in HIV/AIDS research and programming in Zimbabwe

68**GUSHA, J. MAKUMBE, M T, TAVENGWA, I, TAVUYANAGO, T, MANYUCHI, C R**

Assessment of the effect of feeding browse and forage herbage and non protein nitrogen supplements on Mashona cattle performance 1: supplement for cattle during the last three months of the dry period of the year; 2: impacts on reproductive efficiency of cattle with emphasis on reproductive weight, weaning weight, milk yield, and conception and reconception rates.

Abstract: Low conception and reconception rates, poor growth rates, low weaning weights and high mortality rates due to depressed digestibility, rumen protein under nutrition, low utilization efficiency of total feeds as well as perennial deficit of feeds for ruminants in range during the dry season lowers animal productivity in livestock production.

69**GUSHA, J, AND TAVENGWA, I**

Effects of Calving season on calf mortality, growth and cow productivity: a case study of Makoholi Research Institute, Masvingo Province

SF201 GUS

Makoholi Research Institute

Abstract: Data was collected for analysis from the research institute records. A total of 120 cows and their calves were used in the investigation. Calving was categorised in three seasons of Jan-April, May-August and Sep-Dec. 40 cow and 40 calves animals for each season were used. There was significant ($p < 0.05$) in pre-partum weigh, calf birth mass and growth rate. Cow productivity was heavily affected by season of calving with animal calving in September resulting in high weaning weight, low mortality and heavier yearlings. Jan-April calves have slightly high birth mass but have low weaning weight as well as yearling mass. Dams that calve down in Jan-April fails to conceive resulting in calving interval of 2 years hence those that calve down in May-Aug often lose condition and die before onset of rains unless well supplemented. High cow mortality was recorded in winter season calvers with lowest rates in Sep-Dec calving seasons.

70**GUSHA, J., TAVENGWA, I. AND MANYUCHI, C. R**

Effects of Harvester termites on rangeland grass species, biomass yield and carrying capacity in semi-arid areas of Zimbabwe

QL529.T4 GUS

Makoholi Research Institute

Abstract: Termites harvesters are a threat to rangelands. Evaluation of the total effects of termites on grass species composition, biomass yield and effects on carrying capacity. In a bid to conserve Makoholi Research Institute rangeland a trial is being conducted to test the efficiency of 3 chemicals/pesticides in order to come up with the best chemical for control. In a complete randomized block design three chemical were applied in three paddocks each and three paddocks were left as the negative control. Grass species composition analysis were done to investigate changes due termites activities. Soil composition and filtration measurements were down to verify the effect of termites.

71 **SF198 GUS**
GUSHA, J., NCUBE, S., DAHWA, E,
TAVENGWA, I. AND CHIUTA, T.

Establishing a composite breed (synthetic Breed) for maximum productivity in communal and small scale production systems

Makoholi Research Institute

Abstract: Exotic breeds often succumb to harsh conditions in communal area. They need sophisticated management skills which are often not offered at communal farming areas. But due to high productivity farmers end up buying them despite high mortality challenges faced. Local breeds on the other hand are hardy and tolerant to harsh condition but with low productivity both in terms of meat output and milk yield. Combining *Bos taurus* and *Bos indicus* in composite breeds may take us a long way in solving challenges of procuring exotic bull for cross breeding programmes which often die before achieving the desired goals. Four breeds shall be used to establish a composite breed namely Red Dane, Mashona, Nkoni and Tuli for high beef, draught power and milk yield. The establishment of a composite breed and evaluation of traits of economic importance shall be done at Makoholi Research Institute. Offspring from generation F₁ to generation F₅ shall be evaluate for all important traits so that the right dose of blood from each breed is mixed

72 **QK595.C11 GUS**
GUSHA, J., TAVENGWA, I, TAVUYANAGO,
T, MANYUCHI, C R

Evaluation of cactus (*Opuntia ficus-indica*) for adaptability, biomass yield and as ruminant livestock fodder in semi-arid regions of Zimbabwe.

Abstract: Cacti are more adaptable in arid and semi arid conditions due to their efficient use of water

and are suitable for use as fodder and as a source of water.

73 **SF233.A35 GUS**
GUSHA, J., TAVENGWA, I, TAVUYANAGO,
T, MANYUCHI, C R

Evaluation of moringa oleifera, gliricidia sepium, melia azedarach and morus alba as fodder; non-conventional protein sources requirements to supplement livestock on veld grass in the dry season.

Abstract: Fodder legume trees are multi purpose trees which can be used for domestic use, firewood, intercropping with food/grain crops and are suitable for range reclamation.

74 **SF239 GUS**
GUSHA, J., NCUBE, S., HALIMANI,
T.E, and NGONGONI, N. T.

Evaluation of the nutritive value of cactus ensiled with high protein browse legume hay.

Makoholi Research Institute

Abstract: In total, three trials were conducted to assess the nutritive value, the silage quality and the digestibility of cactus (*Opuntia ficus-indica*)-browse mixed silage. Microbial protein yield was estimated using the allantoin technique and the organic matter degradable in the rumen. Five legume hays were used in the study namely; *G. Sepium* (CGSM), *C calothyrsus* (CCCS), *L leucocephala* (CLLS), *A angustissima* (CAAS) and *M.atropurprum* (CMAS) hay. The chemical analysis showed that CLLS (4.02%) had the highest N levels compared to the other silages. N levels were significantly different ($p < 0.05$) among treatments diets. Tannins and DM effects were also significantly different ($p < 0.001$) among treatments. In the allantoin technique, the amount of allantoin produced was significantly different ($p < 0.05$) being higher in high N, low ADF and low tannin diets than high tannins, low N and high ADF. CCCS had the least amount of allantoin output compared to other treatments and this could attributed to high tannins in this diet, which lowers microbial degradation and microbial protein synthesis. In the nitrogen balance trial and digestibility trial, high retentions were recorded in high N, low tannins and low ADF diets. High fibre diet had negative N retention and very digestibility. The performances of the animals in experiment were also evaluated and the animals in CLLS supplements had higher live weights gains compared to animals in other treatments and hay. Significantly higher digestibility coefficients were recorded in high N supplements diets and low in hay diet alone.

Apparent digestibility coefficient was calculated and it ranged from 45 to 72% of the OM. It was observed that tannins and ADF had a negative relationship to microbial yield and digestibility. There was significant difference ($p < 0.05$) among treatment in digestibility and N retention.

75 **SF239 GUS**
GUSHA, J., TAVENGWA, I. AND
MANYUCHI, C. R.

Screening of cactus (*Opuntia ficus indica*) for utilization as fodder in semi-arid region in Masvingo Province

Makoholi Research Institute

Abstract: In a split plot design 9 cactus varieties were planted in two sites at Makoholi Research Institute. Two manure levels were used and the area was block using terrain resulting in two block according to drainages. Replication was done twice, varieties are made up to 7 exotic varieties and two local varieties. Preliminary results favours manure and good drainage area. Some varieties have grown to third leaves yet some are still struggling to establish

76 **SF239 GUS**
GUSHA, J., TAVENGWA, I, TAVUYANAGO,
T, MANYUCHI, C R

Utilization of cactus (*Opuntia ficus-indica*) legume silage as protein and energy source to substitute maize meal and dairy concentrates in small scale dairy industry in semi-arid regions of Zimbabwe.

Abstract: Low milk yields due to poor quality and poor availability of cheap high quality feeds for use in dairy industry in the semi-arid regions of Zimbabwe by small scale farmers.

77 **HD5702 HAR**
HARRISON, David E. & CHINOKUYA, J.
Employment Experience for Economic
Development

Human Resources (Pvt) Ltd

Abstract: Zimbabwe's population of 14 million, with only 800 000 persons employed in the formal sector, may require numerous, widespread industrial, commercial and agricultural "apprenticeships" offering opportunities for experience, performance-related training, as means of support for "talent in waiting."

78 **HB615 HAR**
HARRISON, David E. POSEN, C. F. &
CHINOKUYA, J
The Formal Sector's Intrinsic Barriers to
Entrepreneurship

Human Resources (Pvt) Ltd

79 **HD2344 HAR**
HARRISON, David E.
Formalization: The Major Criterion of Success in
Developing Countries

Human Resources (Pvt) Ltd

Abstract: A Case Study describing the difficulties experienced by a small business owner in attempting to form the formal sector.

80 **HD2341 HAR**
HARRISON, David E. & CHINOKUYA, James
The "Illegal" Informal Sector in Zimbabwe

Human Resources (Pvt) Ltd

Abstract: Studies of the informal sectors in African economies have typically investigated unregistered but usually not criminally illegal small businesses. Illegal businesses open up at night time when survey "enumerators" have usually returned to their hotels. We propose to use suitably educated and trained "participant observers" to further the work of David E. Harrison & Memory Senda (A Combined Method Questionnaire/Case Study Survey of 7 Informal Sector Business Types, January, 1994) in this massive, economically important, and under-researched sector.

81 **HD30.4 HAR**
HARRISON, David E.
Management Training in Zimbabwe

Human Resources (Pvt) Ltd

Abstract: Managers in Zimbabwe face difficulties in motivating their work groups in a context of the worker-orientated Labour Relations Act of 1981 and subsequent regulations. Well educated, but inexperienced and negatively indoctrinated employees require techniques of persuasive management which are not incorporated in most empowerment orientated models available from the "developed" economies.

82 **HD2346.Z56 HAR**
HARRISON, David E. & BLOCH, Eric
MSE Regrowth after Murambatsvina

Human Resources (Pvt) Ltd

Abstract: Small Scale Resilience/Large Scale Repression. Informal and largely unregistered Micro and Small Scale Enterprises were destroyed by government in 2005 under an exercise entitled "Murambatsvina."

This sector has shown remarkable re-growth. Our study attempts to measure the pace and extent of re-growth, and the attitudes and needs of enterprise owners.

83 **HF5382.5.Z56 HAR**
HARRISON, David E. & CHINOKUYA, James
Vocational Guidance in Zimbabwe

Human Resources (Pvt) Ltd

Abstract: Secondary school students and the unemployed are severely limited in their access to professional educational advice and vocational guidance. This study evaluates the extent and impact of the problem, and proposes possible solutions.

84 **QK494.5.P66 JIM**
JIMU, L. KATSVANGA, C A T ,
KUNDHLANDE, A, NYAMUGURE, T,
GWENZI, D, MUPANGWA, J F
Comparative growth of pinus taeda and pinus patula in Penhalonga, Zimbabwe

Bindura University of Science Education

Abstract: Growth and yield comparisons of P patula (patula pine) AND p. taeda (Loblolly pine) commonly grown on Zimbabwean plantations were carried out on four sites in Penhalonga. Measurements were done in observation sites at 10, 15 and 20 years where mean height, DBH and dominant height were obtained with the subsequent calculation of volumes. Results indicated that growth of the pine species significantly ($P < 0.05$) varied by site and species. However volume productivity at 20 years did not differ significantly ($P > 0.05$). It was concluded that site productivity was masked by silvicultural interventions as well as species tolerance limits within a narrow environmental range. The study recommends that the two species under comparison can effectively be grown in the study area to sustain the timber industry.

85 **QK495.G74 JIN**
JINGURA, R M., SIBANDA, S and
HAMUDIKUWANDA, H.
Yield and nutritive value of tropical grasses grown without fertiliser treatment in semi-arid tropics

University of Zimbabwe

Abstract: Five grasses (sorghum bicolor cv. PNR 841, pennisetum purpureum cvv. Napier SDPP19 and Bana, Chloris gayana cvv. Giant Rhodes and Cynodon nlemfluensis cvv. Star-grass No. 2) were grown in experimental plots (6m x 6m) on four soil types in Gokwe South District, Zimbabwe. The soil

types were sandy, sandy loam, sandy clay loam and clay. The first three soil types are regosols formed on Kalahari sands and the clay soil is black vertisol derived from basalt. The forages were grown without fertiliser treatment from 1995 to 1998. Forage yield was significantly affected ($P < 0.001$) by type of soil. In terms of digestible organic matter yield, the grasses were ranked in descending order as Bana, Napier, Sorghum bicolor, Chloris gayana and Cynodon nlemfluensis on the sandy, sandy loam and sandy clay loam soils. On the clay soil, the descending order of the grasses in terms of dry matter yield was Sorghum bicolor, Bana, Napier, Chloris gayana and Cynodon nlemfluensis. These results indicate that in this District, Napier and Bana grass were the most suitable for most soils other than clays with average yields of 5.9 and 6.4 t/ha respectively. Sorghum bicolor was the best on clay soils with a yield of 8.9 t/ha. The results show that grasses often grown in the high rainfall areas can still be grown in this District.

86 **GT2073 KAD**
KADUNGURE, Charity

An investigation on young women's perceptions on second hand and new imported undergarments and the impacts on their sexuality: a study of Harare urban.

Women's University in Africa

Abstract: The rapid expansion in commercial exports of second hand and new undergarments from the First World to the Third World and the increase in second hand clothing (undergarments) consumption in many African countries raise challenging questions about the effects of globalization. This study attempts to avail the various existing perceptions and make visible and record some thoughts and reflections of women on underwear and impact on sexuality. If it can be found that in society there are obstacles and/or reservations to underwear and sexuality then various approaches and suggestions shall be proposed at the end of the investigation. The stand point of this research is that women do not have reservations or serious phobias to underwear and sexuality; hence they need to know that such issues under discussion are relevant to them and affect their daily lives.

87 **TP577 KUT**
KUTYAUROPO, Josphat, Parawira, Wilson,
TINOFA, Sharai, KUDITA, Ivy, NDENGU,
Clement

Investigation of shelf-life extension of sorghum beer (Chibuku) by removing the second conversion of malt.

University of Zimbabwe, Delta Beverages

Abstract: The effect of removing the second step of malt conversion in the brewing of Chibuku beer was investigated with the intention of extending the shelf-life of the product. Chibuku was brewed in the laboratory scale fermenters using Delta Beverages' standard brewing procedure. A variation was made where the second malt conversion was not conducted on one brew. The effect of increasing pasteurisation time was also investigated. The extension of shelf life was determined by following the physiochemical and the sensory profile of the products for a period of ten days under sub-tropical ambient conditions. Ethanol productions were similar between the control and test beers (without second conversion malt). A product with overall acceptability of 70% was made from the brew without the second malt conversion and with 15min pasteurisation at 80 °C. The product was however low in bite and head retention, but had less bacterial load, decreased acid production and improved keeping quality by at least two days. However, due to contamination of the pitching yeast with lactic acid bacteria (LAB), total acids rapidly increased after 168 h and caused unacceptable sourness. Increasing pasteurization time to 20min reduced bacterial load of the wort to figures as low as 2×10^3 cfu/ml. General hygiene levels of the brewery were acceptable and no coliforms were detected in the product or contact surfaces along the production line. Bacterial contamination of the product mainly comes from the raw materials with pasteurisation greatly reducing this load. If improved, the procedure has the potential of extending the shelf-life of the beer to beyond 168h.

88 **QK495.C1997 KUT**
KUTYWAYO, D, NZARAYEBANI, D.H. and
MTETWA, N.

Evaluation of Carica papaya leaf extracts for the control of leaf rust.

Coffee Research Station

Abstract: The ever-increasing costs of inorganic fungicides makes it difficult to fully control coffee leaf rust. Papaya leaf extract was found to be effective against coffee leaf rust therefore, the idea behind trying it. If found to be effective, it will reduce the traditional dependency on inorganic fungicides which requires the much needed scarce foreign currency. The objective is to find cheaper and environmental friendly methods of controlling leaf rust.

89 **SB608.C6 KUT**
KUTYWAYO, D, and MTETWA, N.
Evaluation of Colombian genotypes for Coffee Berry Disease (CBD) resistance/tolerance.

Abstract: CBD is currently confined to the Northern part of Zimbabwe where it has caused tremendous amounts of yield loss. The current cost of chemicals is very restrictive especially to smallholder farmer. It is hoped that some tolerant progenies will be found and seed production will then start and farmers will be able to grow coffee without wasting too much money on chemicals. The objective is to screen new Colombian genotype for their tolerance to the local strain of *Colletotrichum kahawae*.

90 **S631 KUT**
KUTYWAYO, D, MAHOYA, C. CHEMURA,
A. MADHLAZI, R.

Evaluation of different application methods of basal fertilizers and granular pesticides on coffee plantation.

Coffee Research Station

Abstract: The high cost of fertilizers and pesticides requires more efficient methods of their application in view of the limited availability of labour. Thus, the thrust of this trial is on finding ways and means of reducing compound J application per hectare without compromising on yield and quality. The main objective is to establish the most efficient and cost effective method of applying basal fertilizers and granular pesticides for optimal efficiency.

91 **S594 KUT**
KUTYWAYO, D, MAHOYA, C. CHEMURA,
A. MADHLAZI, R.

Soil moisture conservation trial.

Abstract: Temperatures are high in the Northern region of Zimbabwe which is a coffee growing area. The trial seeks to establish a planting depth which conserves moisture for coffee plantations. The main objective of the trial is to find effective methods for moisture conservation in coffee plantations.

92 **QL696.P2 LEI**
LEITNER, STEFAN, MUNDY, PETER and
VOIGT, CORNELIA .

Morphometries of White-browed Sparrow-Weavers *Plocepasser mahali* in south-western Zimbabwe (2009)

National University of Science and Technology

Abstract: This paper describes size and body condition of individuals in a population of the cooperatively breeding White-browed Sparrow-Weaver *Plocepasser mahali* in south-western Zimbabwe in relation to the birds' social status within their colony. We undertook measurements

and observations of colour-ringed individuals during two successive breeding seasons. Each colony was organised into a dominance hierarchy, with a single dominant breeding pair and male and female subordinates. Our results showed that males were generally larger than females in body mass, wing and bill length. Within each sex size was not significantly related to dominance status. Body condition did not vary by sex, age or status.

93 **SF376.2 MAB**
MABUKU, O, MURUNGWENI, O, NYAMA C,
CHIBI, S.

Evaluation of staggered mating systems during the eight months breeding period for goats and sheep.
Grasslands Research station

Abstract: Accelerated breeding program involves mating systems that produces three kid/lambs every two years. Accelerated breeding has extensively been evaluated in Zimbabwe. Most commercial farmers in Zimbabwe practice accelerated breeding but in a way that produces lambs/kids at one specific time of the year. This system encourages flooding of the sheep and got meat market at one time of the year and shortages at other times. This leads to inadequate and inconsistent supply of meat on the market. The problem can be addressed if a successful staggered breeding system can be put in place. The specific objective of this research program is to effect of period of mating on reproductive and production traits of does, ewes and offspring born from staggered breeding of three months interval.

Evaluation of frequent mating systems such as continuous mating once a year mating twice a year mating and three lambings/kiddings in two years have been evaluated and found to be successful in Zimbabwe. The assumption being made in this experiment is that if 8month breeding period of small ruminants is staggered in intensive production systems, then there may be a continuous supply of stock for slaughter. In this system, the progeny shall be intensively fattened using least-cost rations, to be ready for slaughter at 8months of age. Energy-based supplements shall be used since it was established from earlier research that energy supplementation affects performance of ewes under 8months more than protein supplements.

94 **SF373 MAB**
MABUKU, O, CHIFAMBA, I K AND TIGERE
A

Productivity of three breeds of sheep lambing annually or every eight months and receiving different planes of nutrition.

Grasslands Research Station

Abstract: In Zimbabwe, sheep are principally kept as meat animals. Increasing the number of lambs born, waned and reared successfully to marketable or breeding weight will increase production efficiency. Theoretically, ewes can be bred to lamb three times in two years. Assuming all other factors remained constant such a system would result in a 505 increase in ewe productivity. However, previous research at Grasslands Research Station has shown such frequent matting to be associated with sub-optimal conception rates and a decline in lifetime ewe productivity. This experiment commenced in 1992 to study the effects of season of lambing, plane of nutrition and breed on flock productivity under both annual and eight-month lambing systems.

95 **S531 MAD**
MADONDO, Benjamin
Agric Education: A Comparative Review of Zimbabwe and USA systems

Zimbabwe Open University

Abstract: The teaching and training of agricultural education and extension in the schools, colleges and universities in Zimbabwe has remained entrenched in the traditions of a general education delivery mode. In this mode, education disciplines are fragmented and trapped in different ministries with different and competing priorities. Policy implementation on education has been hampered by competing priorities of ministries in which the disciplines are housed. This has had a negative impact on service delivery and production in agriculture. The current policy and its programmes fail to meet the demand and expectations created by the land reform programme of 2000. The programme requires a consolidated policy which can direct its focus on the human and agricultural development needs of the reform. Its key priority is the consolidation of agricultural education and extension programmes with adequate resources to enable them to develop the country's human capital in agriculture. The process here will require extensive restructuring of the existing agricultural and formal and non formal educational entities and placing them where they have institutional and resource autonomy for operation.

96 **SF95.4.Z56 MAD**
MADZIMURE, J & MAMHURE, E,
Evaluating the performance of beef cattle supplemented with Guar beans (Cyamopsis tetragonolba) as a protein source.

Henderson Research Station

Abstract: In Zimbabwe, ruminant livestock production is limited by nutritional deficiencies

resulting from insufficient feed resources and low quality of availability grazing especially in winter. Use of conventional feedstuffs is now very expensive and most farmers cannot afford to purchase them. Use of non-conventional and drought tolerant Guar beans can be an option.

97 **RA644.A25 MAG**
MAGOMBEDZE, G., MUKANDAVIRE, Z.,
CHIYAKA, C and MUSUKA, G
 Optimal Control of a Sex-Structured HIV/AIDS Model with Condom Use (2009).

National University of Science and Technology

Abstract: Optimal control theory is applied to a sex-structured HIV/AIDS model with condom use as an intervention strategy. An objective functional to maximize condom use in a population and minimize cases of infectious HIV is adopted. The optimal control is characterised and solved numerically. Simulation results suggest that high percentage of condom usage is associated with reduced HIV incidence, while high costs of condom usage campaigns reduces the percentage condom usage. Targeting issuance of condoms to infectious individuals enables reduction of condom usage campaign costs, hence ensures high percentage of condom usage.

98 **S494.5.A25 MAG**
MAGURANYANGA Caleb
 Remote sensing crop types and crop yields in Zimbabwe

University of Zimbabwe

Abstract: The ongoing fast-track land reform programme has seen farmers being allocated pieces of land which some are fully utilizing, others underutilizing whilst some are not utilizing the allocated land at all irrespective of the extent of utilization prior to the change in land utilizers. There have been intervention measures such as the government input schemes; however there has not been corresponding production on the farms of beneficiaries. For applying effective intervention measures that can increase the overall production there is need to accurately measure the extent of fully utilized land, underutilized and land not utilised. Currently data about land up-take and production are collected by laborious ground visits. However, the findings from these ground visits are mainly qualitative and subjective, in other words they lack exhaustive evidence. I propose to improve the data collection necessary for resolving land up-take and production issues by providing accurate and objective data through analysis of satellite imagery and aerial photography.

The unavailability of a real time land utilization monitoring system at the key Ministries (*Ministry of Agriculture and Ministry of Lands, Land Reform and Resettlement*) that lead the ongoing Land Reform Programme in Zimbabwe has resulted in confusion regarding the quantification of productivity of agricultural land. A good knowledge of which areas are cultivated, as well as their agricultural production is a prerequisite for any policy decisions concerning Zimbabwe's agricultural development plans.

However to date, there is no clearly defined, reliable method of monitoring land utilization and production in Zimbabwe. Few case studies and subjective formal surveys by the Ministry of Lands, Land Reform and Resettlement, and by the Ministry of Agriculture have been conducted. However, they do not suffice to aid national agricultural planning. Hence there is an urgent need to develop a systematic and scientific method of monitoring land utilization.

99 **RA644.A25 MAH**
MAHATI, Stanford
 Responses to HIV and AIDS and Gender Based Violence needs of cross-border mobile populations at the Zimbabwe-South Africa border

Biomedical Research and Training Institute

Abstract: There has been widespread evidence of increased risk of exposure to HIV among vulnerable cross border mobile populations (VCBMP) mainly due to the sexual and gender based violence experienced in the process of mobility. The recurrent droughts, the general economic decline, poverty, food insecurity and social instability in the country resulted in unprecedented numbers of people, most of them without valid travel documents, to engage in short-term migration to neighbouring countries, especially to South Africa. A substantial number of them are deported back to Zimbabwe everyday, where upon return; some are forced to depend on limited resources and adverse coping mechanisms, including transactional sex, making them vulnerable to sexual abuse. Thus the VCBMP are at great risk of contracting HIV and other sexually transmitted infections (STIs).

After the realization of the problem, the International Organization for Migration (IOM) in partnership with United Nations Population Fund (UNFPA), working with Save the Children-Norway (Zimbabwe) and United Nations Children's Fund (UNICEF) in 2008 commissioned BRTI to carry out a study aimed at establishing and documenting gender based violence (GBV) prevention and support needs of mobile and vulnerable populations in Beitbridge, as well as

documenting the current capacity of SGBV protection and health services. The study also sought to come up with baseline data to be used to design and implement research informed interventions designed to reduce the vulnerability of women and adolescent girls and boys to HIV and AIDS.

Objectives of the Study- to collect baseline information which will assist in the following:
The prevention of SGBV among irregular migrants
Determining support needs of SGBV among vulnerable cross border mobile populations
Establishment of the current capacity of protection and health services as well as a referral mechanism regarding SGBV among vulnerable cross border mobile populations.

The study was both a cross sectional and an exploratory descriptive study designed to fully establish and document the gender based violence prevention and support needs among mobile and vulnerable populations specifically women, adolescent girls and boys.

100 **SB269 MAH**
MAHOYA, C. CHEMURA, A. and
MANDLAZI, R

Effect of pre-planting seed treatment on germination and initial growth of coffee.

Coffee Research Station

Abstract: The time required for coffee seed to germinate is normally from 6-10weeks, but varies with age of seed, sowing depth and time of the year at which the seed is sown. Hastening seed germination saves the farmer a few weeks of nursery work and costs. This trial was set up to determine how age of seed and pre-planting seed treatment affect rate of coffee seedling emergence and subsequent seedling development.

101 **SF198 MAK**
MAKUMBE, M.T. & CHIRISA, M

An assessment of the dressing percentage of Mashona cattle off veld.

Abstract: The dressing percentage of Mashona cattle has been noted to be within a 'range' and there is need to ascertain a more accurate figure. There is need to assess the best slaughtering time/period. This is all in the interest of increasing the breeds' information base.

102 **SF198 MAK**
MAKUMBE, M.T. & CHARUKA, E.

Conservation and improvement (breeding and selection) of Mashona cattle.

Abstract: There is need to conserve and improve the indigenous Mashona cattle of Zimbabwe which are facing extinction through reckless genetic dilutions. Objective of study is to conserve and breed the Mashona cattle as pure breeds and improve on their merits.

103 **SF199.G8 MAK**
MAKUMBE, M.T. & ZVIREGEYI, K

Evaluation of various Mashona crosses: Guernsey x Mashona and Jersey x Mashona, for dairying in Zimbabwe's smallholder sector with an emphasis on the proportion of Bos Taurus blood that gives best results.

Abstract: There is need to obtain a suitable dairy cross for the smallholder sector of Zimbabwe so as to boost the low productions in milk and ultimately the national milk production levels. The main objective is to obtain the best suitable Mashona dairy crossbreed for the smallholder sector in Zimbabwe.

104 **SB327 MAK**
MAKUNDE, G.S.

Advanced Variety Trial (AVT)

Abstract: The objective is to compare 30 bean lines.

105 **SB327 MAK**
MAKUNDE, G.S.

Evaluation of segregation population families' generation of new recombinants.

Abstract: The objective is in creating a new variability targeting drought stress and malnutrition in order to improve fertilizer content in beans.

106 **SB327 MAK**
MAKUNDE, G.S.

Nurseries and introductions.

Abstract: The objective is to test adaptation of bean line so as to increase genetic diversity in the program.

107 **SB327 MAK**
MAKUNDE, G.S.

Preliminary Variety Trial (PVT)

Harare, Gwebi Stations

Abstract: The objective is to compare 30 bean lines.

108 **HB2123.2.M4 MAL**

MALUNGA, George

A spatial analysis of population density and Human development in Rural Zimbabwe: The case of Mhondoro Communal lands

University of Zimbabwe

Abstract: This study seeks to investigate and quantify the nature of the relationship between population density, both arithmetic/crude and physiological, and the level of human development in rural Zimbabwe. A special reference to Mhondoro communal lands will be made. The literacy rate, life expectancy and output per capita indices will be used as dimensions of the familiar Human Development Index (HDI) to produce a map of development for the study area. The conventional HDI, devised by the United Nations (UN), is an index that uses the above three variables to measure the level of human development.

The density and development maps that will be produced will help express the association of phenomena under study. The study area is located in Chegutu Rural District of Mashonaland West province and it falls in natural agro-eco-region 2. Mhondoro is basically agrarian with a greater proportion of its population depending almost entirely on land for subsistence.

The quantification of poverty according to districts has been done before in Zimbabwe. The Human Poverty Index (HPI) has been used in the Zimbabwe Human Development Report (ZHDR) of 2003, for example, to rank the country's districts according to their levels of poverty. This research study however, will go on to explore the possibility of any spatial correlation between population density and human poverty in the rural areas of Zimbabwe. This research will also explore the population density or growth factors namely birth and death rates and migration within rural Zimbabwe in general and Mhondoro communal lands in particular

109

QL678.5 MAN

MANDAVA J., MUNDY P., DE GRARINE-WICHATITSKY M., CARON A. GAIDET N. AND COUTO F.M.

Trends in waterbird numbers, community structure and species diversity in lakes Chivero and Manyame (Zimbabwe), 1993-2003

National University of Science and Technology

Abstract: Total counts of waterbirds were conducted on two Zimbabwean lakes (Manyame and Chivero) over a ten-year period. The lakes are

permanent, artificial and are under government protection. The counts were carried out four times a year (January, April, July and October). In addition, data on lake levels and habitat characteristics were also collected. This ten year data set covers a full cycle of low and high lake levels and incorporates all seasons. This may form an adequate baseline for further studies aimed at conservation and protection of species that may be declining, as well as conservation of the habitat. Trends in species diversity, species richness and species abundance were quantified in relation to habitat characteristics and lake levels. Statistical analyses were carried out to test for significant differences in species abundance, species diversity and species evenness over the years (and seasons) and between the two sites. A grand total of 39 and 32 surveys were done for lakes Chivero and Manyame respectively, covering all the seasons of the year. Analyses revealed that the most abundant species was the red-billed teal *Anas erythrorhyncha* and the redknobbed coot *Fulica cristata*. The total number of birds censused and the number of species in each survey was positively associated with lake levels and habitat composition. The years with abundant rains resulted in high lake levels and an increased abundance of herbivore and invertebrate-eater bird species. The drought years with low rainfall resulted in an upsurge of waders on the two lakes. Knowing that waterbirds are the main reservoir (in Europe and North America) of low pathogenic avian influenza (LPAI), we would like in the future to understand the population dynamics of some key species of waterbirds in relation to the potential endemicity of some LPAI and possible emergence of HPAI.

110

S592.6.H43 MAN

MANYANGA, A. and MANYEVERE, A.

Vertical variability in concentration of selected heavy metals (Ni, Pb, Cd and Cr) in ultramafic influenced soils at Mamina Irrigation scheme.

Abstract: Continuous use of irrigation water with high amounts of heavy metals can lead to accumulation of heavy metals in the soil. Plants have different rooting depth; therefore, determining the variation in available heavy metal (Ni, Pb, Cd and Cr) concentration down in the profile will help in selecting the best crops to grow on special soil basing on rooting depths of the plants. Elevated heavy metal concentrations can lead to human and animal exposure to heavy metals. The objectives of study are (i) to determine total and available heavy metal concentration and Ca:Mg ratio down the profile; (ii) To ascertain the potential source of heavy metals if they are found to occur in concentration above normal levels (whether river system or parent material); and (iii) To determine

the heavy metal soil pollution from prolonged irrigation with Mamina dam water.

111 **G70.2 MAN**
MANYEVERE, A., MUBVUMBA, P & CHIKWARI, E.

Geographical Information System (GIS) based soil resource map and database of Zimbabwe.

Abstract: Soils information available does not cover the whole country and soils map were lat produced in 1979 mainly from reconnaissance surveys. The data which is available is in analogue format and it is tedious and time consuming to search for soils information hence the need for a user friendly package. The objectives of study are (i) to gather information through field work (National Soil Survey) and subsequent laboratory analyses; and (ii) to create an electronic database using existing data in analogue format and data collected from soil surveys.

112 **S618.45 MAN**
MANYEVERE, A. and MUTENGWA, S.

Irrigation water quality database: salinity/sodicity hazards.

Abstract: Information on water quality is not readily available and also the link between irrigation water quality soils is not available in Zimbabwe, hence the need to build on this information base for agriculture in Zimbabwe

113 **S593.25 MAN**
MANYEVERE, A. & MUNJONJI, L.

Smallholder farmer practices at Bruton Resettlement area: acceleration and management of crusting soils.

Abstract: Low yields due to crusting, inappropriate management practices that worsen soil crusting and there are geologies which rise to soils with high silt content. The objectives of study are (i) to assess the nature and distribution of crusting soils at Bruton; (ii) to determine how farmers accelerate soil crusting; and (iii) to determine management practices employed by smallholder farmers in averting soil crusting.

114 **QL529.26.Z56 MAN**
MANYUCHI, C R, TAVENGWA, I, MAKUMBE, M T, & GUSHA J

Harvester termites (*Hodoterms mossambicus*): 1 an assessment of the effects various termicides on Harvester termites in semi-arid sandy soils of Zimbabwe; 2 the effects of Harvester termites (*Hodoterms mossambicus*) on range grass species, biomass yield and soil losses in semi-arid sand soils of Zimbabwe.

Abstract: The harvester termites have degraded the paddocks and rangelands at Makoholi and other surrounding areas, causing veld deterioration, reducing biomass yield and also causing severe land degradation due to soil erosion.

115 **SB608.S6 MAR**
MARAVA, G.

Evaluation of the efficacy of traditional indigenous knowledge systems in control of pests in cove, rape and tomatoes.

Abstract: In agrarian systems where the uses of synthetic crop protection methods are not playing a significant role, farmers use a variety of direct and indirect measures to protect their field cultures and storage goods. Safe and sustainable methods of pests and weed control were practised by indigenous smallholder farmers long before the introduction of the western agriculture and its synthetic pesticides and inorganic fertilizers. Traditional knowledge should be taken as atoll or instrument for promoting culturally sensitive or appropriate forms of development, particularly in the areas of food, agriculture and natural resource management.

116 **SB950.3.Z56 MAR**
MARAVA, G.

Evaluation of traditional remedies on stem borer management in sorghum.

Abstract: Lepidopterous stem borers constitute a major constraint in the production of grain sorghum in Zimbabwe and the whole of Africa. Common stem borers include spotted (*chilo partellus*, SWP), maize stalk borer, (*Busseola fusca*), fuller and pick stem borer (*Sesamia calamities*, Hmps). Major species of economic importance in Zimbabwe are maize stalk borer and the spotted term borer. In view of the realization of the stem borers as a priority number one sorghum insect pest in the Lowveld, it was decided to evaluate remedies made from leaf and seed extracts of neem, Azadrica, Pawpaw *Carica papaya* and mutsviri trees for their efficacy in controlling stem borers and determine the suitable concentrations of the extracts.

117 **SB349 MAR**
MARAVA, G.

Impact of timing and method of trellising on the effectiveness of pests and diseases control practices in tomatoes.

Abstract: Commonly grown tomato varieties have weak stems that need to be supported for them to have an erect growth stature. This practice is known as trellising or staking and commonly referred to as training of tomatoes. Trellising is important for keeping leaves and developing fruits

off the ground that may be the source of infection of most troublesome fungal diseases. An erect growth allows the whole plant to be completely soaked in chemicals during spray operations giving higher chances of effective control. The objectives of study are to determine the effect of method and timing of trellising on the effectiveness of spraying of tomatoes and determine how quality and yield of tomatoes is affected by method and timing of trellising.

118 **S603.5 MAR**
MARINGA, D., MUFAKOSE, J. and DUBE, T.
The effect of cassava population on the yield of groundnuts and cassava when the two crops are intercropped under rain fed conditions in natural region 5.

Abstract: The Southeast Lowveld of Zimbabwe natural region 5 receives low, erratic and poorly distributed rainfall. Farmers in the region get crop failures or poor yields in most seasons due to drought. Cassava, once established can stand any drought situation. Groundnuts are also drought tolerant and can produce yields where other crops could have failed. Therefore intercropping cassava and groundnuts could improve crop yields. The main objectives of study are to determine the effect on yields of groundnuts and cassava of intercropping the two and to determine the effect of population on yields of two crops.

19 **SB211.C3 MAR**
MARINGA, D., MUFAKOSE, J. and DUBE, T.
The effect of cassava population on the yield of sorghum and cassava when the two crops are intercropped under rain fed conditions in natural region 5.

Abstract: The Southeast Lowveld of Zimbabwe natural region 5 receives low, erratic and poorly distributed rainfall. Farmers in the region get crop failures or poor yields in most seasons due to drought. Cassava, once established can stand any drought situation. Sorghum is also drought tolerant and can produce yields where other crops could have failed. Therefore intercropping cassava and sorghum could improve crop yields. The main objectives of study are to determine the effect on yields of groundnuts and sorghum of intercropping the two and to determine the effect of population on yields of two crops.

120 **S633 MAR**
MARINGA D.
The effect of Zai pits and mechanized zai on crop productivity under rainfed conditions in the southeast lowveld of Zimbabwe

Chiredzi Research Station

Abstract: The major constraints to crop production in the southeast lowveld of Zimbabwe are low rainfall amount, poor rainfall distribution and poor soil fertility. A trial was conducted at Chiredzi Research station to determine the effect of zai pits and mechanized zai (deep tied plough furrows) on the yields of sorghum and to investigate the effect of inorganic fertilizers, manure and crop residues and combinations of inorganic and organic amendments. Results show that the conventional way of planting on the flat and planting without adding fertilizers or manure significantly reduced sorghum yields. Zai pits and mechanized zai did not have significant differences with the flat method because moisture was not liming throughout the growing period. A combination of buried stover and 100 kg /ha A.N had the highest yields. However, no recommendations can be done since the project had only one season in the field.

121 **SB351.P3 MAR**
MARINGA D.
Groundnuts Variety Evaluation Trial 2008/2009

Chiredzi Research Station

Abstract: Groundnuts (*Arachis hypogea*) is a very important leguminous food and cash crop that provides protein in diets and facilitates good rotation with cereal crops. The common variety that was grown in natural region V was Natal Common but due to successive droughts the standard variety disappeared. Farmers plant groundnuts they receive from drought relief handouts and most of those varieties are not suitable for this region. A trial was conducted at Chiredzi Research Station to determine the yield potential and adaptability of early varieties: Nyanda, Jessa, Illanda, Mwenje and a line ICG 12991. The rainfall season was good in both the amount (585 mm) and distribution and as a result all the varieties performed equally well. There were no significant differences in dry pod yields. However, there were significant differences in 1000 seed weights.

122 **SB191.S7 MAR**
MARINGA D.
Sorghum Variety Evaluation Trial 2008/2009

Chiredzi Research Station

Abstract: A trial was conducted at Chiredzi Research Station in the dryland block to determine the yield potential and adaptability of eleven sorghum varieties. Standard varieties; macia, SV4 and Sila performed equally the same as a regional variety, Karimtama 1 and a line NL 2041 but significantly outyielded other varieties and lines;

Sariaso10, CZI SEL, Mahube,NL2040, NL2026 and SDSL89473.Mahube significantly matured earlier than other varieties but had significantly lower yields than other

123 **SB205.S7 MAS**
MASAKA, J, MHAZO, C., MUSHUKU, M I

The effects of planting position, timing of nitrogen and phosphorous fertiser rates on growth and yield of soybean (*Glycine max L*)

Midlands State University, Chisumbanje Experiment Station

Abstract: The amount of nitrogen fixed symbiotically is rarely adequate for optimal plant growth. Appropriate tillage systems can be adapted to specific soil in order to amplify soybean yield response to added fertilizers. A 36-week field experiment was carried out at Chisumbanje Experiment Station (2048 S; 3214 E, ele.>300m above sea level, Zimbabwe) on a soybean crop in order to determine the effect of timing nitrogen and phosphorous fertiser application rates in three seedbed configurations on seedling emergence, nodule weight, plant height, aboveground biomass and yield (biometric characteristics) of soybean. Planting soybean on 0.5 m wide ridge seedbeds enhanced germination. Planting soybean on flat seedbeds reduced seed germination by 62.5% compared with 0.5m wide ridge seedbeds. Widening ridge seedbeds to 1m whittled down seed germination by 32.3% compared with 0.5m wide ridges.High root nodule weight does not necessarily increase grain yield. The 0.5m wide ridge beds, which had the highest seedling emergence score, recoreded the largest yield responses. On flat seedbeds, vassal application of P₁₂₀ and N₃₀ at planting increased biomass by 2.6g plant¹ while the reduction of P fertilizer application rate to 80kg/ha¹ and the delay of N30 topdressing to 6 weeks after planting improved aboveground vegetaitive dry weight by 2.9g plant-1. Cutting the ridge seedbed width from 1m to 0.5m increased soybean grain yield by 41.6% when P₈₀ was applied as a pre-planting fertilizer and N₃₀ as topdressing at six weeks after planting. The 0.5m wide ridge seedbeds had 27.3% more soybean grain yield over that in the 1m wide ridges when P₁₂₀ was applied as a pre-planting fertilizer and N₃₀ was applied at planting. Delaying the application of N₃₀ to six weeks after planting and downgrading P application rate from 120 to 80kg ha¹ reduces soybean yield by 20.3g plot¹ in the wide ridges, increased grain yield by 106.9g and 67.6 plot¹ in the narrow ridge and flat seedbed variants respectively.

124 **SB211.C3 MAS**

MASHAVAKURE, N, MUCHINA, G. and RUGARA

Cassava variety: cow pea intercropping in Zimbabwe.

Mlezu, Makoholi Research Stations

Abstract: Intercropping cassava and a traditionally grown annual crop like cow pea is expected to enhance adoption of cassava by our local farmers. Cassava and cowpea are both adapted to acidic soil conditions and have a compatible growth habit. The genotypic incompatibility between cassava and component crops in an intercropping system has been suggested by previous workers but not elucidated in Zimbabwe.

125 **SB211.C3 MAS**
MASHAVAKURE, N RUGARA and NYREYEMHUKA, J A

Effect of defoliation (cutting back) on leaf and tuberous root yield of selected cassava (*Manihot esculenta Crantz*) varieties.

Henderson, Mlezu Research Station

Abstract: Zimbabwe's semi-arid regions in which most of the smallholder farmers are found is threatened by perennial feed and food shortages. Cassava is a drought tolerant crop that can be used for both food and feed production. This suitability of local and introduced cassava varieties for feed and food production in Zimbabwe has not been elycidated. The main objective of this study is to determine the suitability of different cassava genotypes for fodder and root yield production.

126 **SB211.S9 MAS**
MASHAVAKURE, N MUCHINA G MANYONGANISE, M

Multi location evaluation of orange-yellow flesh sweet potato varieties in Zimbabwe

Makoholi, Panmure Research Station

Abstract: Vitamin A deficiency is prevalent in Sub-Saharan Africa including Zimbabwe and it's reported to cause death in 250 000 – 500 000 children per year. Orange and yellow flesh sweet potato varieties are known to be rich in β-carotene, a precursor of Vitamin A. Zimbabwe received 15 orange/yellow flesh sweet potato varieties from the International Potato Centre (CIP) and these varieties have not been adequately evaluated under local conditions. The main objectives of this study is (i) to evaluate adaptability of CIP-improved sweet potato varieties to different agro-ecological conditions in Zimbabwe, (ii) to promote the production of orange yellow sweet potato varieties

with the aim of alleviating Vitamin A deficiency in Zimbabwe

127 **SB211.C3 MAS**
MASHAVAKURE, N MUCHINA, G.,
RUGARA and NYREYEMHUKA, J A
 Evaluation of cassava genotypes in Zimbabwe.

Matopos, Panmure, Makoholi, Kadoma

Abstract: Zimbabwe has a rich genetic base composed of both local collections and introductions from IITA (Nigeria), Australia, Malawi and Mozambique. The performance of most of the introduced varieties under local agro-ecological conditions is not fully known. The acceptability of the different varieties by local consumers is also unknown. The main objective of this study is to evaluate the adaptability of different cassava genotypes to different agro-ecological conditions in Zimbabwe.

128 **SB201.H8 MAS**
MASHAVAKURE, N, MUTATAVIKWA, G
 Competition between rye grass (*Lolium rigidum* Gaud) and irrigated wheat (*Triticum aestivum* L) in Zimbabwe.

Henderson Research Station

Abstract: Rye grass competition can cause up to 75-100% wheat grain yield loss. Previous work has shown that rye grass competition can be reduced by increasing wheat density. Rye grass has been observed as a serious weed of wheat in Mashonaland Central (Zimbabwe). There is limited information on wheat/rye grass competition studies in Zimbabwe. The main objective of this study is to determine the competition effects of rye grass and wheat using the additive series

129 **RB153 MAS**
MASON, Peter R.
 CEUP (Centre for Entero- and Urogenital Pathogens) project

Biomedical Research and Training Institute

Abstract: This is a collaborative study involving the University of Sassari (Italy), University of Zimbabwe Departments of Medical Laboratory Sciences and the Veterinary Science Department, Public Health Laboratories of Zimbabwe, the Central veterinary laboratories and the Biomedical Research and Training Institute.

This is a collaborative study on the distribution of Entero- and Urogenital Pathogens in humans and animals with special interest on the surveillance of entero- and urogenital pathogen outbreaks, their

molecular epidemiology and distribution of pathogenicity inducing genes. The study also has a reagent unit, which seeks to develop low cost reagents for use in serotyping of pathogens.

To achieve its objectives, the study is made up of 5 units. Which are-

Outbreak Unit, at the Harare Hospital Public Health microbiology laboratory
 Archival unit, within the Biomedical Research and Training Institute Laboratories
 Molecular epidemiology unit, within the Central Veterinary Laboratories
 Pathogenicity unit, within the Department of Medical Laboratory Sciences, College of Health Sciences, University of Zimbabwe
 Reagent unit, with the Faculty of Veterinary Sciences, University of Zimbabwe

130 **R853.H8 MAS**
MASON, Peter R. & GANGAIDZO, Innocent T.

An evaluation of Drug Trial participants' understanding of the informed consent process

Biomedical Research and Training Institute

Abstract: EDCTP funded project (BRTI EDCTP ETHICS GRANT (CB.07.41302.08) set to establish an Ethics Research Unit (ERU to support and promote the current ethical review boards of the Colleges of Health Sciences and the BRTI, which will operate as a resource centre locally and regionally on matters relating to research ethics.

131 **SF97 MAT**
MATEKENYA, T.D., MAKIWA, P.,
ZVAVAHERA, C.C., CHIKUMBA, L. P.
 Effect of *Acacia angustissima* as a nitrogen supplement on milk yield and composition in dairy cows.

Henderson Research Station

Abstract: In Zimbabwe, ruminant livestock production is limited by nutritional deficiencies resulting from insufficient feed resources and low quality of availability grazing especially during the dry season. There has been a deliberate attempt to encourage smallholder dairy production nationwide. However, the dairy industry has been marked by a decline in milk production due to reduced gross margins resulting from high feed costs and low producer prices. Alternative and cheaper protein sources therefore need to be sought. Leguminous multipurpose fodder trees have been tried and have shown great potential for growth, production, persistence and have high nitrogen supply. There is therefore the need to

evaluate the feeding potential of multipurpose fodders such as *Acacia angustissima* for dairy production.

132 **SF221 MAT**
MATEKENYA, T.D., MADZIMURE, J.
ZVAVAHERA, C.C., MAKIWA, P.

Use of Guar beans (*Cyamopsis tetragonoloba*) as a protein source in dairy diets.

Henderson Research Station

Abstract: Soya beans, sunflower cake and cottonseed meal have formed an integral part of conventional protein sources in livestock diets. There has been high demand for these protein sources due to low supply from the droughts that have been experienced in Zimbabwe; the prices have become unaffordable for most farmers. The need for alternative protein sources that can compete or out-compete the conventional ones becomes paramount. Guar bean has been extensively used as a protein source in livestock diets in many parts of the world. It has a high crude protein comparable to soyabeans has great establishment properties and is drought tolerant. Of special interest would be the incorporation of Guar bean in dairy concentrate diets to assess impact on milk production and quality.

133 **S279 MAW**
MAWOYO, Tanyaradzwa Amanda

An investigation on the effects of sugarcane monoculture on selected soil properties. a case for Section 26 of Hippo Valley Estates.

Hippo Valley Estates

Abstract: To study the impact of sugarcane production on soil properties and then find ways to reduce the negative effects it has on the soil properties.

134. **S599.5.Z56 MAN**
MAZULU, A and MURWIRA, M.,
MUKUNGURUTSE, C.

Long term soil fertility trails.

Grasslands Research Station and Makoholi Research Station

Abstract: Farmers in communal lands have been shifting from using livestock manure as a fertilizer to mineral fertilizers. Changes in soil fertility under long term continuous use of mineral fertilizers on weakly buffered sandy soils have not been evaluated. The dynamics of organic matter turn over in the cropped soils of the communal and resettlement areas are little understood. There is need for monitoring organic matter changes and

nutrient turn over from recycled crop residues. The main objective of the study is to determine soil fertility requirements for long term economic crop production on sandveld soils under different soil fertility inputs.

135 **S633..5.A35 MAZ**
MAZULU, A and MURWIRA, M.

Soil fertility consortium for Southern Africa

Abstract: The main objectives are (i) to improve research and development efficiency on improved integrated soil fertility management through collaborative research for development so as to minimise duplication of efforts and enhance regional priority setting; (ii) to identify major soil fertility problems and related issues to be pursued and build on past achievements; and (iii) to collaborate and link production research to economics, policy, and market issues because of a wide multi-disciplinary stakeholder ship of the consortium.

136 **SB351.C3 MHA**
MHAZO, M. L.

Carrots flowering and seed production trial.

Horticulture Research Centre

Abstract: There is need to produce open pollinated seed for various horticulture crops to save costs and to have timely inputs. The main objective of the study is to find out if four open pollinated cultivars of carrots flower can produce seed from seeds and stecklings.

137 **SB341 MHA**
MHAZO, M. L.

The effect of mother bulb size and d row spacing on the seed field of onion cultivar.

Horticulture Research Centre

Abstract: The main objective of the study is to find out the best mother bulb size and best row spacing onion for varieties.

138 **SB211.T2 MHA**
MHAZO, M. L.

Morphological analysis of Taro/coco yam *Colocasia esculenta*.

Horticulture Research Centre

Abstract: The objective of the study is to identify the type of coco yam grown in Zimbabwe and to produce coco yam planting material and get an overview of taro production in Zimbabwe and study the agronomy of the crop.

139 **SB314 MHA**
MHAZO, M. L.

Onion cultivar evaluation trial.

Horticulture Research Centre

Abstract: Seed onion produced on farm can be used to produce onion for sale and to sell some of the seed to other farmers. Timely input availability is important in Agriculture. The main objective of study is to find out yield performance of seed onion produced on farm.

140 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Generation advancement of S4 and S5 segregating populations.

Harare Research Station

Abstract: The objective of study is to advance 77 S4 and 53 S5 segregating populations by a generation on the basis of agronomic performance and oil content under pollination bags.

141 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Inbred line improvement.

Abstract: The objective is to improve the inbreeds SC552 & N3.2.3.3 for MSV & GLS resistance, and RA150P & SVIP for & seed yield using the backcross & S1 recurrent methods.

142 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Line purification.

Abstract: The objective is to clean one elite inbred segregating for tassel, silk, & stem colour.

143 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Observation trials.

Abstract: The main objective is to evaluate the performance of 107 single cross hybrids relative to three standard hybrids under well fertilised (Gwebi & Kadoma) disease (Harare), low-N (Harare & Makoholi), and drought stress (Save) environments.

144 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Population improvement.

Abstract: The improved composites will be used as source populations for the extraction of drought tolerant inbred lines for use in the constitution of drought tolerant hybrids and OPVs.

145 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Preliminary variety trials.

Abstract: The main objective is to evaluate the performance of 260 single cross hybrids relative to three standard hybrids under well fertilised (Gwebi & Kadoma) disease (Harare), low-N (Harare & Makoholi), and drought stress (Save) against 10 check varieties.

146 **SB191. M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Seed multiplication

Harare, Gwebi, Save and Chisumbanje

Abstract: The objective of the study is to bulk inbreeds, single cross parents, experimental and commercial hybrids and OPVs for use in trials and supplying breeders seed to companies contracted by institute.

147 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Single cross hybrid constitution.

Abstract: The objective is to assess the combining ability of 32 CBI MSV-Tolerant inbred lines by crossing them to 4 CIMMYT & 3 CBI elite inbred lines.

148 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Test crossing for combining ability.

Abstract: The objective of this study is to determine the combining ability of 864 S3s and S5s using 4 tester groups (N3, Sc, and CIMMYT A and B) under hand pollination. This will enable the identification of potential inbreeds for the constitution of high yielding and stress tolerant hybrids and OPVs.

149 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Test crossing of 210 Lines using the inbreeds CMS HA89 and CMS HA290 as testers.

Gwebi College, Harare

Abstract: Number and diversity of existing inbreeds (A-, B- and R-Lines) requires enhancement to enable the constitution of better performing hybrids. The study will focus on determining the potential of 210 Lines (S7) in hybrid production by test crossing them to the females CMS HA89 and CMS HA290 as testers under pollination bags.

150 **SB191.M2 MHI**
MHIKE, X., MUTIMAAMBA, C

Three-way hybrid constitution.

Abstract: The objective is to generate three-way hybrids & to identify two single cross testers for use by the national programme.

151 **SB945.A5 MOL**
MOLECULAR characterisation of the red and green morphs of the tobacco aphid

Tobacco Research Board

Abstract: To characterise the red and green morphs of the tobacco aphid using molecular methods.

152 **SB945.A5 MON**
MONITORING for seasonal fluctuations in aphid populations on flue-cured tobacco

Tobacco Research Board

Abstract: To determine correlations between climatic factors (temperature, rainfall, etc.) and aphid trap catches.

To determine the relationship between aphid trap catches and incidence in the field (monitor on well-watered and water-stressed plants).

To develop rapid techniques for identification of *Myzus nicotianae* (using a combination of morphological characters and molecular techniques).

153 **SB193 MPO**
MPOFU, Z.S. MUKWASI, P., NGULUBE, B., HALTSHWAYO, A.S.

Evaluation of four forage species under organic and inorganic fertilizer in a semi arid area of Zimbabwe.

Abstract: Animals grazed on Stylo based fodder banks daily for two hours obtained supplementary crude protein equivalent to 1kg/day of cottonseed cake concentrate feeds like groundnut meal and cottonseed cake as supplements for ruminants have become scarce and expensive to the communal farmer who is also faced by drought. It has also become unprofitable to finish cattle on such feeds. There is therefore need to evaluate suitable legume species for range reinforcement since they can be a potential substitute for the commercial feeds. There is also limited information on the establishment of legumes in semi-arid areas. Objectives of study are (i) to determine the effect of manure and fertilizer on legume establishment and yield; (ii) to compare the yield and growth of legumes under two different soils (heavy and light) and (iii) to

compare the response of three legumes to varied watering regimes.

154 **SB211.C3 MTE**
MTETWA, G

Cassava Variety Evaluation Trial

Chiredzi Research Institute

Abstract: Cassava is the 3rd most important source of calories within the Tropics (Meeting the challenges of the new millennium, 2008). Approximately 600 million people consume cassava on a daily basis. Billions of people will rely on cassava for food security and economic development in the coming decades (Meeting the challenges of the new millennium, 2008). Total cassava production grew by 75% over the last 3 decades, but productivity per unit area increased by less than 0.7 per year. Biotic and agronomic constraints mean that average cassava yields are only 15% of its potential production. A trial was conducted at Chiredzi Research on the evaluation of five different cassava varieties to get better yielding cassava varieties that will boast production and productivity. Results showed that TMS82/0661, TMS82/0075 and XM6 performed the same, while TMS82/030555 and Maus 7 showed significantly lower performance

155 **SB211.C3 MTE**
MTETWA, G. and MUCHINGANI, Z.

Cassava uniform yield trial.

Abstract: Cassava is not a new crop in Zimbabwe but it is not widely grown due to fear of hydrogen cyanide by the Zimbabwean community and also lack of markets. Selection of the right variety for our environment and market is one of the important factors in cassava production. Farmers in Zimbabwe are not acquainted with the processing techniques to remove hydrogen cyanide in cassava. This will give varieties that are suitable to our eating preferences as we are used to just boil and eat without processing. The main objective of this study is to select high yielding, low cyanide cassava varieties in Natural Region 5 of Zimbabwe.

156 **SB191.R5.Z56 MTE**
MTETWA, G

Effect of different varieties on ratooning height on yield and yield components of rice grown under Lowveld conditions of Zimbabwe

Chiredzi Research Station

Abstract: Rice productivity in Zimbabwe is very low and one of the reasons is production conditions in which the crop is produced. Rice is produced on residual moisture under wetland conditions and/or

overhead irrigation. However the crop should be grown under flooding systems because it loves wet fit. A trial was carried out at Chiredzi Research Station in Natural region 5 to evaluate different rice varieties on their ratooning ability at different ratooning heights as a way of increasing productivity per unit area per given season. Results show that there were significant yield differences among varieties with Mhara 2 and NERICA 5 showing significantly lower yield ($p < 0.05$) compared to NERICA 7. There were no significant yield differences between Mhara 2 and NERICA 5. Only NERICA 5 showed significant low yield as compared to the other varieties. The trial was supposed to be planted early to allow the ratoon crop to come in during periods of high favorable temperatures. The subsequent trial will be planted early enough most probably in September or October.

157**SB191.R5.Z56 MTE****MTETWA, G**

The effect of direct seeding and transplanting of rice varieties on grain yield

Chiredzi Research Institute

Abstract: Transplanting rice is widely used in rice growing regions of the world. In Zimbabwe direct seeding is widely practiced while transplanting of rice is not a common practice. Although direct seeding is a common practice in Zimbabwe, it has the disadvantages that the seeds are often exposed to birds and rodent attack. Direct seeded rice has a greater tendency to lodge than transplanted rice because the base of the direct seeded plants are not so deeply set as the transplanted ones. Another problem is that not all varieties are suitable for direct seeding. A trial was conducted to evaluate the two sowing methods. There were significant differences on plant heights with Mhara 2 direct seeding showing significantly shorter plants as compared to all other treatments. Transplanted Mhara 2 showed no significant height differences to Mhara 1 direct seeded. Mhara 1 transplanted and direct sowing showed significant higher ($P < 0.05$) panicles per square meter as compared to Mhara 2. Transplanted rice was fast growing and showed more vigour than the direct seeded one. Mhara 2 direct seeding showed significant higher tillers numbers per plant as compared to other treatments. There were no significant differences between varieties and method of sowing on 1000 seed weight. However, Mhara 1 had a slightly bigger seed as compared to Mhara 2. direct seeded rice had heavier seed as compared to transplanted rice though no significant differences were shown. There were no significant yield differences ($p = 0.05$) on total yield between varieties and between methods of planting

158.**SB211.C3 MTE****MTETWA, G., MUCHINGANI, Z. RUKUNI, T.**

Effect of fertility on yield and yield components of cassava in NR1 and 2 of Zimbabwe.

Abstract: Cultivation of cassava is widespread due to its ability to grow in poor soils. Cassava has extensive root system and uses plant nutrients which are not easily accessible by other crops. In traditional farming without fertilizers, farmers can obtain yields of 5-6t/ha on soils that do not support other crops. However, for good growth and yield cassava require a balanced amount of plant nutrients. Under favorable conditions cassava can give yields of 40-70t/ha. The objective of the study is to determine fertilizer levels for optimum cassava production under Natural Region 1 and 2

159**SB596.53 MTE****MTETWA, G., MUCHINGANI, Z. CHIKIWA**

Effect of fertility on yield of Jatropha.

Abstract: Nearly half of the world's poorest people live on marginal land, with minor expected to increase from 500million to 800million by 2020. Jatropha is a plant that needs to be explored as far as oil potential is concerned and also its potential for eliminating poverty. While Jatropha plants grow with minimal inputs of either material or management, the biggest challenges to explore its optimum production levels with the use of proper management. The use of fertilizers will improve productivity and reduce poverty among the rural community. The nutrient removed by a yield of 200kg seed is estimated at 80kg N, 18kg P₂O₅, 12kg CaO and 10kg mgO. Like any other plant replacements of nutrients taken from the soil for seed production is necessary. The main objective of the study is to determine the effect of different fertilizer combination on growth and yield response of jatropha under irrigation and rain fed.

160**S603.5 MTE****MTETWA G. AND DUBE, R.C.**

Effect of planting geometry on maize and cowpeas intercropping systems under irrigated conditions in the South-eastern Lowveld of Zimbabwe

Chiredzi Research Institute

Abstract: Intercropping is said to have advantages that include better use of physical resources such as solar radiation, mineral nutrients and water, high labor productivity and reduction in risk of complete crop failure (De and Singh, 1979). It also ensures sustainable food production while maintaining soil fertility, increased land usage and higher production per unit area and time (Zulu, 1998).The

level of pest and disease damage among different crop species can be reduced significantly through intercropping (Mutsaers et al., 1993; Trenbath, 1993). The increasing number of research documents on intercropping in several parts of the world suggests that scientists have recognized the importance of this cropping system in modern agriculture. This is particularly so in the small-scale farming sector in developing countries where, human population pressure on limited arable land demands maximum crop productivity per unit land. Therefore there is greater potential to integrate legume in the existing maize cropping systems as intercrops. If legumes are inter-seeded on time growth competition with the maize crop can be reduced at the same time that plant biomass and nitrogen can be accumulated by the legume cover crop (Jeranyama et al. 1998). However, if the two crops are planted at the same time at different planting geometry the competition can be reduced greatly. This technology is likely to benefit the current maize companion crop, but will benefit a subsequent maize crop.

161**S603.5 MTE****MTETWA, G.**

Effect of planting geometry on maize and soybeans intercropping systems under irrigated conditions

Chiredzi Research Institute

Abstract: A trial was carried out to evaluate the effect of intercropping maize with soybeans. This was done to try and boost the maize crop by using different planting geometry with different legumes namely soybean (*glycine max.*). The planting geometry included 1:1 1:2 and 1:3 (maize to legume rows respectively) intercropping with different plant spacing in soybean. Maize and legumes were also planted as sole crops. Maize was planted in rows spaced at 0.90m and soybeans spaced at 0.45 in sole cropping.

There were no significant yield differences on Land Equivalent Ratio (L.E.R) when intercropping maize and soybeans. However sole cropping of soybeans, maize, and 1:3 ratio of maize to soybeans with 0.1 cm and 0.15 cm spacing of soybeans, and sowing maize and soybeans in the same row had Land equivalent ratios of more than one

162**S191.W5 MTE****MTETWA G., MUCHINGAMI Z. AND CHIRINZE N**

Effect of seed rate, method and time of sowing on yield and yield components of wheat (*Triticum aestivum L.*) grown under Lowveld conditions of Zimbabwe

Chiredzi Research Institute

Abstract: This study examined the effects of sowing date, seed rate and planting method on yield of wheat under Lowveld condition of Zimbabwe. Trials were conducted at Chiredzi Research Station and Middle Save Experiment Stations for three seasons (winter 2004 to winter 2006). Variety Nduna was planted in all seasons. The sowing methods were drilling and broadcasting using five different seed rates (50, 100, 150, 200 and 250kg/ha) at two sowing dates (1st week of May and 1st week of July) A split plot design was used with method of sowing as main plot and seed rate as sub plots. Lower seed rate significantly delayed flowering and maturity and produced panicles that were significantly bigger. Grain yields were significantly reduced $p < 0.05$ when sowing was delayed

163**SB327 MTE****MTETWA, G., MUCHINGANI Z,**

Effect of sowing date on 20 different bean varieties under Lowveld conditions of Zimbabwe

Chiredzi Research Institute

Abstract: A trial was conducted on the effect of sowing date and variety on yield of beans in the Lowveld at Chiredzi Research Station. Twenty different varieties of field beans both determinate and indeterminate were used. The varieties were OPS-RSI, XAN 76, Zebra beans, Grey light, Carioka, Sugar beans, Mus 97, White Kidney, AND897, Cim 9406-3, Ren22, Iris MCM 2203, Nyanga Red, Cim9314-17, APN136, Michigan pea bean, Red Canadian Wonder, Black beans (Negro Apollo) and Mug 38. All varieties came from Crop Breeding Institute. The trial was planted every first week of the month for the year 2004, 2005 and 2006. Row spacing of 45cm and intra-row spacing of 7cm (317460 plants /ha) were used. The seed was sprayed with thiram at planting to prevent fungal infection. Results show that the number of pods varied across seasons with highest numbers ranging from January to June with indeterminate varieties having more per plant. The number of seeds per plant also increased significantly from March to June. The number of days to flowering also increased significantly as sowing date was delayed from January to June This was the same with days to maturity. Marketable yield also increased significantly as the sowing was delay from January up to June. It was evident that May sowing date was the best in almost all the varieties

164**SB211.C3 MTE****MTETWA, G., MUCHINGANI, Z. RUKUNI, T**

The effect of time of planting and variety on yield of cassava in Natural Region 1 and 2.

Abstract: In Zimbabwe cassava has been taken as a poor man's crop and has been given less attention and priorities as far as planting is concerned. Tuberous root formation or root bulking deepens on soil condition, temperature, quality of planting material and variety. Tuber formation starts at 20-40 days after planting. In Rushinga planting is done throughout the year whilst in Mutoko most farmers plant in July/August at the end of the winter season. Mutoko has a relatively high water table. The objective of study is to determine the most appropriate time of sowing and variety of yield of cassava under rain fed conditions in Natural Region 1 and 2 of Zimbabwe.

165 **S191.W5 MTE**
MTETWA, G. AND FAMBISAI, L
Effects of intercropping wheat with sugar beans on plant growth and yield

Chiredzi Research Institute

Abstract: Wheat is one of the most important food crops, whilst sugar beans is an important cash crop grown in winter in Zimbabwe. Sugar bean is a primary source of proteins and is eaten as relish with sadza by most Zimbabweans. Intercropping ensures sustainable food production while maintaining soil fertility, increased land usage and higher production per unit area and time (Zulu, 1998). One of the aims of intercropping is insurance against total crop failure in cases of poor weather or pest epidemics (De and Singh, 1979).

166 **SB191.R5 MTE**
MTETWA, G Milling recovery of two rice varieties as influenced by grain moisture content and fertility levels grown under Lowveld conditions of Zimbabwe

Chiredzi Research Institute

Abstract: Among cereals, protein of rice is one of the most nutritious protein. Much of the variability in the protein content is caused by environmental factors. A trial on the effect of nitrogen on quality of rice and the effect of grain moisture content on de-husking quality was conducted at Chiredzi Research, Chisumbanje and Middle Save Experiment Stations in the Lowveld (NR5) of Zimbabwe under irrigation conditions. Two varieties Mhara 1 and Mhara 2 were used in the experiment. Four fertility levels (0kgN/ha, 50kgN/ha, 100kgN/ha and 150kgN/ha) were applied. After harvesting five-grain moisture levels (12%, 14%, 16%, 18% and 20%) were considered when de-husking. Samples were sent to ICRISAT Matopos for analysis. Results show that as the nitrogen input increased the crude protein and total protein also increased significantly. It was also

observed that Mhara 1 variety has significant higher crude protein as compared to Mhara 2 at any applied nitrogen level. Mhara 1 also showed a higher rate of increase of crude protein and total nitrogen content as compared to Mhara 2. De-husking at 14% moisture content gave the best results for the two varieties with 14% losses. As the amount of nitrogen applied increases up to 150kgN/ha the quality of de-husked rice also increased significantly.

167 **SB245 MUB**
MUBVEKERI, W. and PAZHE T
Effect of foliofert cotton fertilizer supplement on seed cotton yield.

Chisumbanje, Cotton Research, Save Valley, Panmure, Nembudziya

Abstract: Shedding generally occurs as a result of nutrient deficiency, high temperature and water stress. Shedding of squares and young bolls because of nutrients deficiencies can be minimized by providing the crop with an adequate supply of nutrients during the critical reproductive phase. The main objective of the study is to determine the effect of foliofert cotton fertilizer on seed cotton yield.

168 **SF140.B54 MUC**
MUCHADEYI, R, CHIKUMBA, N AND CHAKOMA, I.
Evaluation and screening of forage legumes for sustainable integration into crop-livestock farming systems of Hwedza District

Grasslands Research Station

Abstract: Forage legume technology has the potential to improve the sustainability and productivity the smallholder farming systems by providing a nitrogen source that can boost both livestock production and (through biological nitrogen fixation). This can be through the integration of forage legumes into these mixed farming systems, and use of legumes to improve veld productivity. Or such forage legume integration to be successful the legumes must be well adapted and produce reasonable quantities of quality forage. Climatically and edaphically adapted species and cultivars suitable for integration into the current farming system need to be selected. A forage legume screening trial was carried out in the Zana and Dendenyore wards of Hwedza District on 42 legume accessions comprising 34 perennials and 8 annuals from 11 genera. Performance of legumes was based on a visual assessment of establishment, vigour, leafiness, flower production, seed shattering tendency and dry matter yield. Vigour and leafiness

were visually rated on a one to five scale (0-nil and 5- excellent while leafdrop pest and disease incidence were rated on a one to five scale (0- nil and 5 extremely severe).

169 **G155.A2.Z56 MUD**
MUDOZORI Gift

The contribution of tourism to local economic development of Victoria Falls town

University of Zimbabwe

170 **RA644.A25 MAG**
MUKANDAVIRE, Zindoga; CHIYAKA,
Christinah; MAGOMBEDZE, Gesham;
MUSUKA, Godfrey; MALUNGUZA, and
NOBLE J.

Assessing the effects of homosexuals and bisexuals on the intrinsic dynamics of HIV/AIDS in heterosexual settings. (2009)

National University of Science and Technology

Abstract: A deterministic compartmental sex-structured HIV/AIDS model for assessing the effects of homosexuals and bisexuals on the intrinsic dynamics of the disease in heterosexual settings in which homosexuality and bisexuality issues have remained taboo is presented. The epidemic threshold and equilibria for the model are determined and stabilities are investigated. Comprehensive qualitative analysis of the model including invariance of solutions and permanence are carried out. The epidemic threshold known as the basic reproductive number suggests that heterosexuality, homosexuality, and bisexuality influence the growth of the epidemic in HIV/AIDS affected populations and the partial reproductive number (homosexuality induced or heterosexuality and bisexuality induced) with the larger value influences the overall dynamics of the epidemic in a setting. Numerical simulations of the model show that as long as one of the partial reproductive numbers is greater than unity, the disease will exist in the population. We conclude from the study that homosexuality and bisexuality enlarge the epidemic in a heterosexual setting. The theoretical study highlights the need to carry out substantial research to map homosexuals and bisexuals as it has remained unclear as to what extent this group has contributed to the epidemic in heterosexual settings especially in southern Africa, which has remained the epidemiological locus of the epidemic.

171 **SB191.R5.Z56 MUK**
MUKOYI, F.

Rice variety evaluation.

Harare, Gwebi, Kadoma and Chiredzi

Abstract: Rice consumption in Zimbabwe is increasing but rice production is still very low. Varieties currently being grown by farmers are low yielding and only suitable for production in vleis. Improved upland rice varieties (Nerica-new rice for Africa) that are suitable for production in both upland and lowland ecologies should be available to rice farmers. The need to evaluate these varieties for adaptability in the various agro-ecological regions of Zimbabwe is a priority before the varieties are available to farmers. The study will focus on identifying and selecting varieties suitable for growth in different agro regions of Zimbabwe.

172 **SB667.C8 MUK**
MUKUNGURUTSE, C & NEMASASI, H.

Assessing the optional combinations of cattle manure and inorganic N and P fertilizers for increased maize production.

Grasslands Research Station

Abstract: Most Smallholders have limited financial resources needed to procure mineral fertilizers hence combining organic and inorganic fertilizers will optimize maize production increasing household food security. Objectives of study are (i) to determine N and P nutrient release patterns of cattle manure and cattle manure inorganic fertilizer mix; and (ii) to identify soil micro organisms involved in the process of mineralization and immobilization during organic residue decomposition.

173 **SB211.C3 MUK**
MUKWASI, P., MPOFU, Z.S., NGULUBE, B.,
HLATSHWAYO, A.S

Evaluation of cassava (manihot esculenta) genotypes as livestocked in the Semi-Arid regions of Zimbabwe.

Abstract: The shortage of good quality fodder for poultry and ruminant livestock and low soil fertility have been identified as the major limitations to the productivity of smallholder farmers in Zimbabwe. A lot of research has been done in regions where cassava is a staple food and it has been found out that cassava can actually be used as a livestock feed (Ravindran 2005). There is need to assess the performance of cassava varieties in biophysical environments where most smallholder farmers are located and also where livestock play a highly significant role. The identification of adapted varieties to this environment has the potential to facilitate a wide scale adoption of fodder supply options by smallholder farmers in Zimbabwe. Objectives of study are (i) to identify high yielding cassava varieties in terms of foliage/herbage production; (ii) to compare the agronomic

performance of different varieties in two types of soils (clays and sands); (iii) to quantify the relationship between the foliage and tuber biomass and (iv) to determine the chemical composition and nutritive value of the leaf and root biomass of the different cassava varieties.

174 **SF995.6.I6 MUN**
MUNDAVA, Josphine, MUNDY, Peter
CARON, Alexandre, GAIDET, Nicolas,
COUTO, Tracey, COUTO, Fernando and
GARINE-WICHATITSKY, Michel de

An ecological approach to estimating the risks of introduction, maintenance and spread of avian influenza viruses in Lakes Chivero and Manyame (Zimbabwe)

National University of Science and Technology

Abstract: Research to date has shown that the understanding the of ecology of the host species is important in the understanding of Avian Influenza Viruses (AIV) introduction, maintenance and spread. Ecological factors influencing AIV introduction include migratory behaviour (Palaeartic migrants & intra-African migrants). These have the potential to bring in pathogens from infected areas. The maintenance of the virus within the system could be attributed to the presence of immunologically naive young that are perpetually being infected as well as the presence of gregarious species. The spread of the virus could be linked to nomadic residents making local movements as well as birds coming into contact with poultry.

175 **QL692.A3.Z56 MUN**
MUNDY, P. J.

Birds noted at the Hwange game count, 2007 (2009)

National University of Science and Technology

Abstract: For the last 35 years, the Matabeleland Branch of Wildlife and Environment Zimbabwe (previously the Wildlife Society of Zimbabwe) has done a 24-hour game count at various pans in the Hwange National Park. The count coincides with the full moon in September so that the nocturnal animals can be most easily seen. For the past few years, the observers at each pan have also been asked to compile a list of birds seen or heard during the 24-hour period, which runs from 12 noon to 12 noon the next day. At the briefing session in early September for the 2007 game count, I was asked to give a talk on the birds of Hwange National Park, and to highlight the important species, or at least the priority species to watch out for during the count. I called for these birds to be identified, counted, categorised if possible

176
MUNDY, P. J.

QL692.A3.Z56 MUN

Short Communications: Hooded vultures and wild dogs (2009)

National University of Science and Technology

Abstract: In the early morning 3 of January 2009 we visited the Nyamandlovu Pan and platform in Hwange National Park. Among the birds present were 12 Hooded Vultures *Necrosyrtes monacalis* - eight were perched together in a tree at the west side, two were standing on a low termite mound, and two' together on the ground. No other vultures were present. At about 07h00 a group of four' Wild "Dogs *Lycaon pictus* came running from the northeast, perhaps chasing a small herd of Impala *Aepyceros melampus* that quickly vanished. The dogs stopped when they were running through a patch of flooded grassland; soon all four were facing the way they had come, in rapt attention, their feet in water. They remained so for 15 minutes or more. During that time, the 12 vultures (and a Marabou Stork *Leptoptilos crumeniferus*) flew to and perched on a short tree, the closest tree to the dogs at a distance of about 30 m. But there seemed to be no interaction between dogs and vultures. At the end of the period the dogs continued trotting on their (original) way, leaving the birds perched in the tree. The birds were still there when we left at 08h30. The weather was clear and sunny, and no breeze. Not only were we thrilled to see the dogs, but the 'incident', if it can be dignified as such, reminded me of Greg Rasmussen's experience (*Honeyguide*, 1997,43: 171) and in particular of Peter Steyn's comment about the "association of Hooded Vultures and Wild Dogs in Botswana (*Vulture News*, 2005, 53: 30-31). Wild Dogs are considered to be diurnal predators, usually in small groups, but do they leave behind any meat from their kills? For their part, Hooded Vultures can fly when there is no wind, and they are nimble when on the ground, so (presumably) they have no fear of this carnivore. Presumably again, the vultures can 'score' food enough times at kills by Wild Dogs to make the "association" worthwhile, but this success in terms of the quantity of meat obtained has never been measured.

177
MUNYATI, Shungu

HV5745 MUN

Global Youth Tobacco Survey (GYTS): Global Youth Tobacco Survey (GYTS)

Biomedical Research and Training Institute

Abstract: In 2008 Zimbabwe, through BRTI, conducted the GYTS whose purpose was to help Zimbabwe, (as would be in the other countries),

develop priorities, establish programmes, and advocate for resources for school health and youth health programmes and policies. This would enable international agencies, countries, and others to make comparisons across countries and within countries regarding the prevalence of health behaviours and protective factors and to establish trends in the prevalence of health behaviours and protective factors by country for use in evaluation of school health and youth health promotion.

The GYTS was a school-based survey conducted primarily among school children aged 13-15 years. The survey consisted of seven modules which covered:

- Prevalence of tobacco use
- Knowledge and attitudes towards tobacco use
- Exposure to second hand tobacco smoke
- Young people's access to tobacco products
- Desire for smoking cessation among youths
- Exposure to pro-tobacco media and advertising school curriculum

The first GYTS in Zimbabwe was undertaken in 1999 after purposive sampling of two provinces to represent an urban area, (Harare province) and a predominantly rural and agricultural population, (Manicaland province) from the ten administrative provinces as per the Ministry of Education, Sport and Culture structures. In 2003 the same two provinces were selected so as to allow comparison and an additional province was added, which is the Bulawayo province. Forms 1, 2 and 3 were the classes that were selected to have children in the age group 13-15 years. For 2008, the three provinces were selected again in order to make further comparisons and determine trends. Children in Grade 7 were also included in 2008's because previous surveys indicated that there were some children in the age-group 13-15 years who were still in Grade 7. A two stage cluster sampling technique was used. Data on school enrolments was obtained with consent from the Ministry of Education, Sport & Culture, Provincial Education Directors and also District Education Officers. Data on enrolment was then sent to CDC and the schools to participate in the survey were selected with probability proportional to enrollment size using a CDC computer programme.

178**HV5745 MUN****MUNYATI, Shungu**

Global School Personnel Survey (GSPS)

Biomedical Research and Training Institute

Abstract: The GSPS is also a school based survey conducted among school personnel to collect information concerning their use of tobacco and their tobacco related school policies and programs. In Zimbabwe GSPS was also conducted by BRTI

using the same sample of schools that were selected for the GYTS 2008 in Harare, Bulawayo and Manicaland provinces. In each region, 25 schools were selected.

The survey covered the following modules:

- Demographics
- Prevalence
- Knowledge and attitudes
- School policy
- School curriculum

179**SF95.4 MUR****MURUNGWENI, Chrispen, NGONGONI, N.T., HAMUDIKUWANDA, H, and HOVE, L.**

Acacia angustissima and calliandra calothyrsus mixed with soyabean meal for supplementary protein to ruminants on native pasture hay basal diet.

Grasslands Research Station

Abstract: Use of the browse legumes in ruminant nutrition is limited by high levels of tannin content. Tannin binds to available protein (both feed and microbial protein) and makes it unavailable for digestion. On the other hand, highly degradable sources (as in soya bean meal) if fed alone, degrade fast resulting in losses of nutrients in rumen, little if any of natural protein will be available at post-ruminal sites. Combining tree legume leaves and soya bean meal may result in synergistic effects at a certain level of mixing that will improve efficiency of utilisation of both the tree legume leaves and the highly degradable protein source. Tannin would protect soya-bean meal from excessive rumen degradation and hopefully release it at post-ruminal sites digestion.

180**SF383 MUR****MURUNGWENI, C., Kamanga B and Tigere A**
The Effect of supplementing grazing goats with paprika calyx and paprika straw on intake of native pasture hay.

Grasslands Research Station

Abstract: In smallholder farming systems of Zimbabwe ruminant livestock mostly depend on natural pastures for their feed. But, it is a well-known fact that protein levels of natural pasture are low (2-3%) during the eight months dry season (April-November). Ruminant livestock require a minimum of 7% crude protein (CP) in their diets for maintenance purposes. This minimum level of protein ensures minimum microbial protein production required to carry out activities that will provide nutrients of the level enough to meet maintenance requirements of ruminant livestock. Although cereal crop residues are in

abundance on most homesteads, their protein content is inadequate to maintain body weight when fed alone. When nutrients are in short supply, supplementation of specific nutrients can be done. Supplementation is a common practice in most livestock farms in Zimbabwe. The only variation is the source of supplement. Most farmers have been using conventional protein sources but are now finding it difficult because of diminishing returns due to ever increasing costs of these concentrates. Since late 90s, work at Grasslands Research Station has been focusing on investigating feed materials found within local communities. One these sources are paprika, which from 1998 has been increasing in popularity with most smallholder farmers as a cash crop. Paprika calyx has CP level of 18%. Interestingly enough, the CP in paprika straw range from 17 to 21 %. Availability of paprika straw and paprika residue was the basis for this experiment. Five groups with 5 goats per group were used in this experiment. Two rates of commercial feeds were used as supplementation levels (10g and 20g of conventional (:1 (16% CP) for two groups. The third group received 100g of 12% cp paprika straw with the 4th and 5th groups receiving 100g and 20g of 18% CP paprika calyx respectively. Paprika calyx and paprika straw were crushed before feeding. Goats were feeding on this supplementary material before feeding on native pasture hay. Preliminary results show increased intake with 100g paprika straw, 100g and 200g calyx but similarly between 100g and 200g calyx.

181 **HN981.C6 MUR**
MURUNGWENI, Chrispen, VAN WIJK, Mark, SMALING, Anderson Eric, GILLER, Ken
 Linking resilience thinking to livelihoods analysis: a new approach to livelihoods research in Zimbabwe's South Eastern Low-Veld.

Grasslands Research Station

Abstract: Understand linked human environment systems is a challenge especially in systems that have undergone change due to various shocks and stresses over time as the South Eastern Lowveld of Zimbabwe shocks in the form of droughts, forced resettlements, floods and now the awaited implementation of the Great Limpopo Tran frontiers Park. Identification of different types of livelihoods and how these types manages to absorb disturbance in their changing environment requires innovative ideas as those presented in resilience thinking. This project uses concepts of fuzzy cognitive mapping (borrowed from ecological systems) and ordination methods to map livelihoods, identify key elements of livelihoods, relationships and their strengths in response to various shocks.

182 **SF95 MUR**
MURUNGWENI, Chrispen, ZVINOROVA, Ivy, VAN WIJK, Mark, ANDERSON, Jons, SMALING, Eric, GILLER, Ken

Hope from the lost plant: demystifying sphenostylis maginata's role in the resilience of livestock based livelihood of people in South East Zimbabwe.

Grasslands Research Station

Abstract: Sphenostyli's magnata has been considered one of the lost plants a nuisance to crop farmers and poison to fish. After 1991-92 drought seasons some farmer discovered his cattle feeding on it because there was nothing else to feed on. They survived drought when those in areas with some grass lost condition and/or died. Use of this plant's tubes has increased from then and belief that it has powerful antihelmintic properties grown with its use. This research seeks to characterise this plant, its distribution, chemical composition and feeding value.

183 **SF203 MUR**
MURUNGWENI,C, KAMANGA, B. and TIGERE, A
 Mucuna pruriens seed in fattening diets for cattle.

Grasslands Research Station

Abstract: Most farmers in Wedza are involved in smallholder dairy and pen fattening. The commonly used protein sources for livestock feeding are the traditional bought in concentrates such as Super 10 and Dairy concentrates. However, these have become too expensive for both the communal and resettled livestock farmers. It is therefore necessary for smallholder farmers to make use of the available home-grown feeds without comprising expected outputs. Velvet bean and lablab were introduced in Zana Resettlement Area and Dendenyore communal area in Hwedza as part of ley legume technologies to improve soil fertility and consequently providing improved quality of forage for livestock. These forage-legumes have high protein levels (over 16%) and palatable and digestible. Forage legumes are also easier to manage compared to most grown crops. These legumes are now most preferred by communal farmers. It is interesting to take notice of the growing number of farmers who are growing Mucuna for improving soil fertility but end up stuck with the large quantities of harvested seed. Mucuna can produce between 1.3 and 2.4 kg of seed per plant. The protein level of Mucuna seed ranges between 22 and 32%. Mucuna grown in Hwedza has CP levels close to 27%. Some cattle farmers involved in fattening business are willing to buy velvet bean seed for their cattle, the main

problem is lack of knowledge on how best to incorporate the see in their fattening programs. Some farmers are already trying to feed velvet seed in crushed form without mixing it with anything. Animals have been eating but with minimal intake. It must be remembered that intake is the first important factor to consider in ruminant feeding before considering nutrient balance. An experiment was therefore set to pre-test the usage of Macuna seed in fattening livestock. One diet was 100% crushed velvet seed (the current practice in Hwedza), the other one was 40% velvet seed and 40% crushed maize grain and 20% hay. The third diet was the conventional 9:1. It was observed that animals eating the first ration (100% Mucuna seed) were slow to appreciate the ration. It took 4 weeks for these animals to have an intake of 1% of their body weight. It was also observed that cattle better appreciated the second ration with an intake of 1.8% of their body weight by the 4th week. The last ration was the control diet and animals were always clearing their allocation as expected. This experiment was used as the basis for the formulation of further experiments involving Mucuna with some other home-grown feeds.

184 **SF95.4 MUR**
MURUNGWENI, Chrispen, ZVINOROVA, Ivy,
VAN WIJK, Mark, ANDERSON, Jons,
SMALING, Eric, GILLER, Ken
 Role of paprika residue, paprika calyx and paprika straw in ruminant livestock nutrition.

Abstract: Paprika production has been promoted through contract farming. Paprika straw, calyx and residue has been tested and found to contain high levels of crude protein (>15%CP). In paprika processing plant, 98% is residue. If this plant is characterised fully products may appreciate in value through livestock feeding. These experiments seek to determine chemical composition and role of different parts of the paprika plant in ruminant livestock feeding systems.

185 **G70.5.Z56 MUR**
MURWIRA, AMON AND SKIDMORE,
ANDREW K.

Comparing direct image and wavelet transform based approaches to analyzing remote sensing imagery for predicting wildlife distribution

University of Zimbabwe

Abstract: In this study we tested the ability to predict the probability of elephant (*Loxodonta africana*) presence in an agricultural landscape of Zimbabwe based on three methods of measuring the spatial heterogeneity in vegetation cover, where vegetation cover is measured using Landsat TM derived NDVI. The three methods of measuring

spatial heterogeneity were: one wavelet-derived spatial heterogeneity measure; and two direct image measures. The wavelet-derived spatial heterogeneity measure consists of the intensity, which measures the maximum contrast in vegetation cover, and the dominant scale, which determines the scale at which this intensity occurs. The two direct image measures are using the NDVI average and the NDVI coefficient of variation. Results show that the wavelet-derived spatial heterogeneity significantly explains 80% of the variance in elephant presence compared with 60% and 48% variance explained by the NDVI average and the NDVI coefficient of variation respectively. We conclude that the wavelet transform based approach predicts elephant distribution better than the direct image measures of spatial heterogeneity.

186 **G70.5 MUR**
MURWIRA, Amon & SKIDMORE, Andrew K.
 Monitoring change in the spatial heterogeneity of vegetation cover in an African savanna.

University of Zimbabwe

Abstract: The extent to which a new intensity-dominant scale approach to characterizing spatial heterogeneity from remote sensing imagery can be used to monitor two-dimensional changes (i.e. variability and patch size) in the spatial heterogeneity of vegetation cover (estimated from a Landsat Thematic Mapper (TM)-derived Normalized Difference Vegetation Index (NDVI)) was tested in the Sebungwe region in north-western Zimbabwe between 1984 and 1992. Intensity of spatial heterogeneity (i.e. the maximum variance obtained when a spatially distributed landscape property is measured with a successively increasing window size) was used to measure variability in vegetation cover. Dominant scale of spatial heterogeneity (i.e. the window size at which the maximum variance in the landscape property is measured) was used to measure the dominant patch dimension of vegetation cover. This approach was validated by testing whether the observed change in the dominant scale and intensity of spatial heterogeneity of vegetation cover between 1984 and 1992 was related to changes in the proportion of arable fields. The results also indicated that there was a significant relationship ($p < 0.05$) between changes in the proportion of agricultural fields and changes in the intensity and the product of intensity and dominant scale of spatial heterogeneity (intensity x dominant scale), suggesting that the new approach captures observable changes in the landscape, and is not an artefact of the data. The results imply that the intensity-dominant scale approach to quantifying spatial heterogeneity in remote sensing imagery can be used for a

comprehensive characterization and monitoring of changes in landscape condition.

187 **G70.5.S7 MUR**
MURWIRA, Amon

Remote sensing of forest carbon and carbon sequestration potential in Southern Africa

University of Zimbabwe

188 **G70.5.Z56 MUR**
MURWIRA, AMON ANDREW K.
SKIDMORE, H.J.G. HUIZING, H.H.T. PRINS

Remote sensing of the link between arable field and elephant (*Loxodonta africana*) distribution change along a tsetse eradication gradient in the Zambezi valley, Zimbabwe

University of Zimbabwe

Abstract: We investigated whether the proportion of remotely sensed arable fields increased along a tsetse eradication gradient in the Sebungwe region. We also investigated whether and to what extent this increase in arable fields affected the distribution of the African elephant (*Loxodonta africana*) between the 1980s and 1990s. Results showed a relatively higher increase in the proportion of arable fields in the zone cleared of tsetse by 1986 compared to the zone that was still tsetse infested by the same date. Results also showed contrasting patterns in the relationship between the proportion of the habitat under arable fields and elephant distribution between the two periods. Specifically, in the 1980s, when arable field cover was between 0% and 11%, there was a weak ($p > 0.05$) positive relationship between elephant presence and the proportion of the habitat under arable fields. In contrast, a significant ($p < 0.05$) negative relationship emerged in the 1990s, when arable field cover ranged between 0% and 88%. Furthermore, the results demonstrated that the change in the probability of elephant presence between the early 1980s and the early 1990s was significantly ($p < 0.05$) related to the change in the proportion of arable fields. In conclusion, this study demonstrated that the expansion of arable fields in the Sebungwe was greater in areas where tsetse had been eradicated compared with areas that were still tsetse infested. Overall, the results suggest that using remotely sensed data, we can conclude that tsetse eradication led to the redistribution of elephants in response to arable field expansion.

189 **BF469 MUR**
MURWIRA, Amon, SKIDMORE, Andrew K.

The response of elephants to the spatial heterogeneity of vegetation in a Southern African agricultural landscape

University of Zimbabwe

Abstract: Based on the agricultural landscape of the Sebungwe in Zimbabwe, we investigated whether and how the spatial distribution of the African elephant (*Loxodonta africana*) responded to spatial heterogeneity of vegetation cover based on data of the early 1980s and early 1990s. We also investigated whether and how elephant distribution responded to changes in spatial heterogeneity between the early 1980s and early 1990s. Vegetation cover was estimated from a normalised difference vegetation index (NDVI). Spatial heterogeneity was estimated from a new approach based on the intensity (i.e., the maximum variance exhibited when a spatially distributed landscape property such as vegetation cover is measured with a successively increasing window size or scale) and dominant scale (i.e., the scale or window size at which the intensity is displayed). We used a variogram to quantify the dominant scale (i.e., range) and intensity (i.e., sill) of NDVI based congruent windows (i.e., 3.84 km × 3.84 km in a 61 km × 61 km landscape). The results indicated that elephants consistently responded to the dominant scale of spatial heterogeneity in a unimodal fashion with the peak elephant presence occurring in environments with dominant scales of spatial heterogeneity of around 457–734 m. Both the intensity and dominant scale of spatial heterogeneity predicted 65 and 68% of the variance in elephant presence in the early 1980s and in the early 1990s respectively. Also, changes in the intensity and dominant scale of spatial heterogeneity predicted 61% of the variance in the change in elephant distribution. The results imply that management decisions must take into consideration the influence of the levels of spatial heterogeneity on elephants in order to ensure elephant persistence in agricultural landscapes.

190 **SK575.S7 MUR**
MURWIRA, Amon, SKIDMORE, Andrew K.
TOXOPEUS, Bert, GRANT, Rina, SMIT, Izak

Spatial partitioning of wildlife species in the Kruger National Park savanna landscape as a function of spatial heterogeneity of vegetation cover.

University of Zimbabwe

Abstract: Based on the Kruger National Park (KNP) savanna landscape in South Africa, we tested whether and how dominant scale (i.e., dominant patch size) of spatial heterogeneity (i.e., variability and patchiness) of vegetation cover spatially partitioned wildlife species. We based this study on aerial survey data of 1989–1993 based on four selected wildlife species: impala (*Aepyceros melampus melampus*), giraffe (*Giraffa*

cameleopardis), kudu (*Tragelaphus strepsiceros*), and sable (*Hippotragus niger*), as well as vegetation cover estimated from a remotely sensed normalized difference vegetation index (NDVI) derived from Landsat Thematic Mapper (TM) imagery of 1990. The dominant scale of spatial heterogeneity of vegetation cover was quantified using a wavelet transform of NDVI obtained from 99 randomly selected transects. Specifically, we tested whether the spatial distribution in the mean, as well as variance of impala, giraffe, kudu and sable population was significantly related with the dominant scale of spatial heterogeneity of vegetation cover. Non-linear regression was used to test whether the spatial distribution of impala, giraffe, kudu and sable was significantly ($p < 0.05$) related to the dominant scale of vegetation cover in the KNP landscape. Results show that impala, giraffe, kudu and sable significantly ($p < 0.05$) respond to the dominant scale of vegetation cover in a unimodal way. The peak variance of impala, giraffe and kudu was observed at 2000 m, while the peak variance of sable population was observed at a smaller dominant scale of 240 m. The results indicate that variations in the dominant scale of spatial heterogeneity in vegetation resources spatially partition wildlife species in the KNP. In other words, results indicate that impala, giraffe and kudu respond to larger dominant scales of spatial heterogeneity vegetation cover (i.e., 2000 m) compared with sable which responds to smaller dominant scales of spatial heterogeneity in vegetation cover (i.e., 240 m). Thus, we deduce that wildlife species in the landscape are significantly spatially partitioned by dominant scale of spatial heterogeneity of vegetation cover. The results have important implications to the management of spatial heterogeneity in savanna landscapes as a way to influence landscape occupancy by different wildlife species.

191 **HD992.3 MUR**
MURWIRA, Amon & SCHMIDT, K. S.

Use of double sampling to improve land cover estimates and land cover change results from coarse scale satellite imagery

University of Zimbabwe

Abstract: The objective of this study is to demonstrate use of the double sampling in optimizing the use of coarse scale satellite imagery with a limited number of fine scale imagery in characterising land cover and trends in land cover change over a large area. Specifically, we used Landsat MSS/TM as coarse scale imagery and aerial photographs taken at limited locations as fine scale imagery to estimate the mean area of the main land cover types, i.e., woodland, arable fields and grassland in the Hurungwe, Kanyati and Gatshe

communal lands in the Zambezi valley in Zimbabwe between 1973 and 1997. The results indicate that double sampling can be used to improve coarse estimates of land cover based on Landsat MSS/TM using aerial photograph estimates with high levels of accuracy. The standard errors of estimate are low indicating high levels of precision in the estimation of the mean. The results of this study show that there was an increase in the area under grassland and arable fields between 1973 and 1997 while the area under woodland decreased during the same period. The study recommends the use of the double sampling approach to provide land cover and land cover change information over large areas.

192 **QK495.L52 MUR**
MURWIRA, M,

Genetic of soyabean inoculants strains: a case study of MAR 1491 and MAR 1495.

Grasslands Research Station

Abstract: Soya bean inoculant's strains have been continually cultured for 40 years at the Grasslands culture collection and this is suspected to have led to loss of key symbiotic properties by mutation. Objective is to compare the genetic, cultural and symbiotic characteristics of inoculant's strains MAR 1491 and MAR 1495 with those of their USDA mother type strains 110 and 122 respectively.

193 **SB667.P22 MUR**
MURWIRA, M. S, PEREKWA, T & MAZULU, A.

Inoculation response of peas fertilized with palletized phosphate blends (PPB).

Horticulture Research Centre

Abstract: Phosphate blends and rhizoidal inoculants are low cost alternatives for smallholder farmers. It is important to know how to maximize yields using their combinations. The objective is to determine the optimum level of P fertilization with PPB and the interaction of rhizoidal inoculants with PPB.

194 **S599.5 MUR**
MURWIRA, M., MAZULU, A. and MUKUNGURUTSE, C.

Protecting vulnerable livelihoods projects.

Abstract: There is declining soil fertility which results in decreasing food production as amongst the smallholder farmers. Also of concern is the incorrect characterization of smallholder farming community problems by various stakeholders (research, extension agencies, NGOs, private

companies and CG centre). The objectives of the study are (i) to identify likely best-bet soil fertility technologies to be promoted amongst smallholder farmers; (ii) to determine information needs and dissemination strategies of identified technologies for use in project demos and brochures; and (iii) to identify training needs of NGO and extension staff in mounting demos and provide backup services.

195**RC311.2 MUT****MUTETWA, Reggie**

Evaluation of rapid tests based on lipoarabinomannan detection in urine and sputum for the diagnosis of tuberculosis

Biomedical Research and Training Institute

Abstract: TB control programs are limited by the capacity to identify TB cases, resulting in a high burden of untreated TB cases in the community resulting in continued TB spread. The biggest constrain to identifying TB cases is the poor performance of available TB diagnostic techniques, smear microscopy and culture, and the absence of rapid and sensitive TB diagnostic kits. Rapid lipoarabinomannan (LAM) detection kits detecting LAM molecule in sputum and urine promise to make TB diagnosis easy and rapid with potential for bedside testing. This evaluation aimed at evaluating the performance of LAM detection kits on two platforms, flow through device and ELISA format. Kit performance was evaluated against smear microscopy, culture and clinical diagnosis.

From TB suspects, spot and morning sputum and urine samples were collected and a blood sample for anonymous HIV testing. For febrile HIV positive TB suspect adolescents, an extra blood sample for TB culture was collected into a MycoF-Lytic culture bottle. Only spot sputum and urine samples were collected from registering TB patients. Sputum specimens were homogenized, split and the split specimens randomized to standard (smear microscopy and culture) or new tests as laid out in the laboratory standard operating procedure (SOP: attached). Smear microscopy used fluorescence microscopy following auramine staining with confirmation of positive smears using Ziehl Neilsen (ZN) staining whilst culture was carried out on solid Lowenstein Jensen media. Blood cultures for MTB were also carried out in mycoF-lytic culture bottles for all the febrile HIV positive adolescent TB suspects. Urine samples were heat treated and centrifuged according to attached SOP to reduced interfering substances.

Sputum sample aliquots randomized to LAM tests were heat inactivated and tested according to manufacturer's instructions and SOPs (attached). Urine samples were split and stabilizing buffer

added to one aliquot and the other aliquot processed and tested with the LAM tests. LAM tests were carried out on fresh specimens that had never been frozen. The LAM tests were run in a different laboratory from the smears and cultures, with technologists running the LAM tests blinded to the smear and culture results. Manufacturer's instructions were followed in sample preparation and testing with the new tests for both urine and sputum samples and these instructions were incorporated in the SOPs.

196**RA644.A25 MUT****MUTITI, Andrew**

Data mining techniques for HIV/AIDS data management in Zimbabwe

National University of Science and Technology

Abstract: An investigation of patterns in HIV/AIDS patient data, through the use of Data Mining techniques will be conducted

197**RA644.I6 MUT****MUTSVANGWA, Junior & MUNYATI, SHUNGU**

Knowledge, attitude, behavior and attitude on avian influenza in rural and urban districts in Zimbabwe-A Baseline survey
Biomedical Research and Training Institute

Abstract: The Avian Influenza study was conducted in six administrative provinces of Zimbabwe - Bulawayo City, Harare City, Midlands, Matabeleland South, Manicaland and Mashonaland West which were the provinces initially targeted by the Ministry of Health and Child Welfare during its initial Avian Influenza prevention campaign. The inclusion criteria when selecting districts within each region was based on having the following features: major water lands (lakes and dams); port health points (areas around border posts and airports) and mixed farming (poultry and piggery).

The data collected was to be used to assist in the formulation of appropriate preparedness and prevention strategies. Carefully selected indicators and data collection methods were used in order to: Identify knowledge levels, attitude, behaviour and practices on Avian Influenza infection/disease among farmers, vendors, children and general population.

Determine the possible roles of poultry farming, processing, trading practices, legislation regarding potential infection and spread of AI in humans and birds.

Establish the prevention and care practices' in relation to potential infection and spread of AI in humans and birds.

The broad objectives were to collect the baseline KAP of farmers, vendors, health workers, veterinary extension officers, consumers (including school children) and teachers with regard to Avian Influenza. This would help to determine the level of previous dissemination of the information from MoHCW, the Department of Veterinary Services and Ministry of Education within the target group and to recommend strategies for improvements with regards to handling of poultry and poultry products. Strategies for a multi-sectoral response regarding Avian Influenza pandemics could then be recommended.

This was a cross-sectional survey using both qualitative and quantitative methods of collecting data. Three questionnaires for vendors, household representatives and children were adopted from the data collection tools which were developed by UNICEF India and adapted by BRTI to suit the Zimbabwean context. The fourth questionnaire for farmers was developed by BRTI in consultation with UNICEF and the Ministry of Health & Child Welfare. The target sample size for the six research sites and for the four quantitative tools was 1 800. Key informants (KIs) were Veterinary officers, Health officials, Port Health Officers, large-scale commercial farmers, officials from Ministry of Education, Ministry of Agriculture, political and traditional leaders.

198 **SB245MUT**
MUTURIKI L

Early season control of sucking pests in dry land cotton

Chiredzi Research Institute

Abstract: Cotton (*Gossypium hirsutum*) is one of the most important cash crops in the smallholder farming communities in Zimbabwe's farming fraternity. Its main advantage is that, it can be grown on a variety of soils and on top of that has adapted some xerophytic characteristics from its wild ancestors, thus can be grown in marginal areas with farmers realizing some economic benefits. Lint is used to make processed cotton; the seeds contain 18-24 % edible oil, and residual cake is rich in protein and is used as an animal feed. However maximum production levels are affected by early season sucking pests. Several species of sucking pest are widespread and these pests occur when the cotton plant reaches a height of 15-20 cm. Adult and immature stages of these pests feed on the undersides of leaves where they suck sap from the plant. Large infestations can cause death of seedlings or wilting of older plants. Once they find a suitable feeding site, they remain on the same spot with their mouthparts inserted into the leaf

tissue. Usually the underside feeding sites appear on the top of the leaf as small yellow chlorotic spots. These mottles gradually increase in diameter until they coalesce and, eventually, such heavily infected leaves are shed. Concurrent with this damage, there may be a reduction in fruit formation potentially due to flower shedding and premature cessation of cotton boll development. All these adverse effects reduce yield and quality of cotton significantly. This small scale field trial is set to assess the effect on yield of controlling sucking pests on dry land cotton early in the season. The trial also seeks to compare the effect of different rates of a soil applied systemic with knapsack treatments

199 **SB245 MUT**
MUTURIKI L

Sorghum/cowpea Intercrop for cultural management of stem borer in dry land sorghum production

Chiredzi Research Institute

Abstract: Investigations on intercropping during the past years have shown that certain non-host combinations such as sorghum/ cowpea and maize/ cowpea reduce crop borer attacks, where as other combinations such as sorghum/ maize boost pest attack. On another view, intercropping systems can be described as being very stable environments that increase crop diversity. The increase in crop diversity often results in decreased insect pest problems. Reduced pest problems result from a number of factors that increase the abundance of natural predators and parasites and interfere with a species host finding abilities.

Increased diversity of habitats and potential prey species in intercropping systems support increased populations of generalized predators. Increased crop diversity impedes host finding by pest species by interfering with chemical and visual stimuli and by creating barriers of non host species by restricting movement. Intercropping has the potential to reduce weed density by limiting effectively the availability of resources to weed species. Weeds further reduce nutrient losses from the system and increase structural heterogeneity and thus impact on insect pest population. Mechanisms of such effect have been elucidated with reference to crop physiology, but works at various agro-ecological zones have indicated also that varying agronomic factors influence production in intercropped systems. Cultivars, time of planting, plant population/ spacing, soil fertility and weed spectrum as known factors in monocultural systems, little is known about the effect of these factors on yield and pest incidences in intercropping systems. Thus this research tries to find out a suitable cultural management system of

stem borer for dry-land sorghum production for smallholder use

200 **SB351.05 MUU**
MUUSHA, L.G.

Determination of the effect of quantity and quality of nitrogen on the growth and yield of okra.
Horticulture Research Centre

Abstract: According to literature there are no records of reliable fertiliser recommendations for okra. The application of nitrogen for example, varies from 60kg/ha to 250kg/ha N worldwide. There is therefore a need to come up with recommendations for Zimbabwe. The objectives of this project are to determine whether there are yield and quality differences linked to source nitrogen and also determine the optimum quantity of nitrogen that will give optimum yields in okra.

201 **S591 MZE**
MZEZEWA, J, GOTOSA, J and
MANYEVERE A

Effect of bush encroachment on vertical soil organic carbon distribution in a clay loam soil in Shangani Ranches, Zimbabwe

University of Venda, Bindura University of Science Education and Chemistry and Soil Research Institute

Abstract: Determination of vertical soil organic carbon (SOC) is essential for assessment of carbon sequestration in ecosystems. A study was conducted in Shangani Ranches to compare SOC distribution and assess carbon sequestration potential of undisturbed savanna woodland and bush encroachment ecosystems on a granitic clay loam soil. The SOC was determined at 0-15 16-30 and 31 – 45cm depth ranges for the five replicate profiles assessed in the two ecosystems. Both ecosystems exhibited an exponential decrease ($r^2=0.87$) in SOC pool with soil depth. The average SOC pool ranged from 24 Mg ha⁻¹ (31-45cm layer) to 42Mg ha⁻¹ (surface) for the savanna ecosystem, whilst the corresponding range for the bush encroachment ecosystem was 17Mg ha⁻¹ to 37 Mg ha⁻¹. The surface SOC pool was significantly higher ($P>0.05$) in the savanna woodland than the bush encroachment ecosystem. In the 16-30cm layer, the bush encroachment ecosystem had a significantly higher ($P<0.05$) SOC pool than the savanna woodland whilst the 31-45cm layer had the reverse scenario. Overall, the savanna woodland significantly stored 2.42Mg ha⁻¹ more ($P<0.05$) SOC than the bush encroachment ecosystem in the top 45cm of soil. Secondary vegetation succession in Shangani ranches was attributed to the differences in SOC allocations in the soil horizons. This study established an abnormal trend in SOC

distribution, such that the shrub-dominated ecosystem had lower SOC in deeper soil horizons compared to the tree-dominated system (savanna woodland). The savanna woodland was found to have more potential to sequester carbon than the bush encroachment ecosystem.

202 **SF180 NCU**
NCUBE, S. and MANYUCHI, C.R.

A survey on Draught Animal Power (DAP) availability in Zimuto Communal Area.

Abstract: Cattle and donkeys are the main sources of Draught Power (DAP) in the smallholder sector of Zimbabwe. Timely cropping in this sector depends on DAP availability. It is therefore necessary to assess the problems that affect DAP availability so as to come up with solutions to the problems.

203 **SF492 NCU**
NCUBE, S. and MANYUCHI, C.R.

A survey of smallholder poultry production in Zimuto Communal Areas in Masvingo.

Abstract: Rural poultry production contributes to sustainable food security in the smallholder farming sector. Indigenous chickens are the most accessible for the resource poor, especially women. The main constraint to indigenous poultry production in the smallholder sector is low productivity which can be improved with minimum inputs. The main objective is to assess the problems that affect indigenous poultry production in Zimuto Communal Areas.

204 **TA404.5 NDL**
NDLOVU, Lookout B

Appropriate Construction Materials for Affordable, Durable and Sustainable Rural Housing in Zimbabwe

National University of Science and Technology

The right to adequate housing as a basic human right is enshrined in the Universal Declaration of Human Rights, and the International Covenant on Economics, Social and Cultural Rights. But with more than a decade after the United Nations (UN) Conference on Sustainable Development in Rio de Janeiro, Brazil in 1992, the world is still struggling to meet its ambitious targets as housing scarcity is acute, complex and still a universal problem especially in the developing world, where more than a billion people still live in substandard houses/slums / places not fit for human habitation. The lack of adequate and durable housing is seen as one of the most pressing problems facing humanity.

The main reasons why the solution to the shelter problem has remained elusive are; the growing population, rapid urbanization in towns, rising costs of construction materials and large gap between supply and demand, inappropriate housing policies, land delivery and planning bottlenecks, lack of finance, low affordability among the majority and recurrent droughts leading to diversion of funds to relief operations. Another contributing factor to the problem of housing provision in the developing countries stems from excessive building regulations, by laws, standards and codes (legislation and bureaucracy). Increased inflation has led to a decline in construction activities, making the building and construction industry suffer as a result of increased raw-material price. At times the building industry just lacks the capacity. Another short-term pressure on housing construction in the developing countries is the government economic reforms geared towards privatizing economies. These reforms, which affect taxation, financial markets, product markets, labour markets and social services, are seen as helpful in the long run, but they have reduced public investment in building in the short term.

'Globally, various efforts have been put up in a bid to ensure adequate housing for the whole populace and thus guarantee this basic human right. In Zimbabwe, as part of implementing the National Shelter Strategy, the Government envisaged a housing for all by year 2000. Funds were allocated for housing construction. In spite of the increased national efforts, the housing situation is continuously deteriorating especially for the poor. The various interventions and strategies adopted in the past to alleviate the problem have achieved little success. The programs have mainly focused on financing low-income housing projects. Above all these systems that have been tried are aimed at providing housing units using conventional building materials, skills and equipment. The resulting shelters are often available to a few, culturally inflexible, environmentally destructive, energy intensive and expensive. The reality though is that Zimbabwe like most developing countries does not have adequate capital resources to construct houses using the conventional materials. If funds to complete housing projects are not available, then strategies and technologies that will allow prospective householders to build within the limitations of their own resources must be adopted. Thus to provide housing in Zimbabwe within the frame work of the existing economy, low cost housing should be looked at.

In housing construction a lot of factors affect the adequacy of the final product. These aspects that should always be taken into account include legal security and tenure, availability of services,

materials and technologies, facilities and infrastructure, affordability, habitability etc. Thus the author's research focus is on two related issues; affordability and, materials and technologies. The broad research topic is appropriate construction materials for low cost rural housing in Zimbabwe. The research's sub-project one entails identification of locally available materials and development of components and adopting appropriate technologies to produce structurally sound and functional effective housing structures. Sub-project two entails the development of code of practice (standards, regulations, specifications) which will address the design, construction, component development, workmanship and maintenance of the identified appropriate materials. This is to ensure integration of the appropriate construction materials into the main stream construction industry and their apparent acceptance. Sub-project three and four will involve gathering of information on construction projects done using appropriate construction materials in Zimbabwe and collating this into a suitable and usable database. The database will be a useful tool to examine past experiences and allow for iterative improvement in the application of the appropriate materials. The final part of this project is the promotion and adoption of the materials and technologies to achieve the desired/anticipated impact.

Because the issues raised in the above mentioned research framework are too broad the focus of project has been on the first sub-project i.e. the identification of alternative construction materials and technologies as well as identification of techniques that could be applied to improve the performance of the traditional construction materials. This is an important component of the broad project as changing the ways buildings are designed constructed and built starts with developing an awareness of the complexity of the relationship and impacts of what we do and other socio-economic issues.

205 **QL795.R45 NDL**
NDLOVU, Mduduzi and MUNDY, Peter J.

Browse preference of captive black rhinos at Chipangali Wildlife Orphanage, Zimbabwe (2009)

National University of Science and Technology

Abstract: Captive black rhinos (*Diceros bicornis*) were offered five species of woody plant in 'cafeteria' trials, for the animals to show any dietary preferences. Six out of seven rhinos were mother-reared, half of them wild born the others captive born. The seventh rhino was hand-reared and this one consumed significantly less browse than did the mother-reared animals. *Combretum hereroense*, *Acacia nilotica* and *Albizia amara* were signifi-

cantly more preferred than *Acacia karroo* and *Peltophorum africanum*. The last named had the highest tannin levels, soluble insoluble, and fibre-bound, which probably accounted for its low preference. No correlations were found between browse preference and crude protein, calcium and sodium.

206 **S597.L4 NEM**
NEMASASI, H, MUKUNGURUTSE, C, & NYIKA, A.

Optimisation of biological nitrogen fixation in legume cereal production.

Abstract: The use of inoculants provides an alternative or substitute to nitrogen fertilizers much to the benefit of farmers. Different rhizoidal strains perform well in different environments. There is need to establish well matched strains for use in different regions. The main objectives of study are (i) to increase the use and efficacy of different rhizoidal strains in different agro zones; (ii) integrate legumes in the smallholder farming system and (iii) intensify legume production.

207 **SB189.4 NEM**
NEMASASI, H, MUKUNGURUTSE, C, & NYIKA, A.

Screening of cereal and legumes genotypes tolerant to low fertility levels (N & P).

Abstract: Soils found in smallholders are inherently low in N and p and chemical fertilizers to build up and maintain soil fertility are expensive. Therefore, crop genotypes of both legumes and cereals that can do well in these soils are a source of relief to household food security. The objectives are: (i) to identify sorghum and cowpea varieties tolerant to low nitrogen and phosphorous levels; and (ii) to increase the role and use of vesicular mycorrhiza (VAM) effect in phosphorous solubilization and intake.

208 **SF361 NEN**
NENGOMASHA, E.M & NKOMBONI, D.

Development of low-cost feed supplements for donkeys (*Equus asinus*) in Zimbabwe: maize by-products, brewers' spent grain, molasses.

Matopos Research Station

Abstract: This project is a continuation of a series of projects to develop low-cost feed supplements for donkeys to improve the condition of donkeys particularly towards the end of the dry season.

209 **SB951.3 NEW**
NEW fungicides for the management of pythium root rot in floatbed seedling production system

Tobacco Research Board

Abstract: To evaluate new fungicides as preventive and curative treatments and applied as a drench for the control of *Pythium* root rot in float bed seedling production system.

210 **SB351.P3 NGI**
NGIRAZI, N.S.

Groundnut crosses.

Abstract: The objective of study is to generate genetic variability by artificial crossing and create more genetic variation so as to have a wide genetic base for selection of genotypes suitable for addressing the farmers' needs.

211 **SB351. P3 NGI**
NGIRAZI, N.S.

Multi-location Advanced Variety Evaluation Trials.

Abstract: The project focuses on the evaluation and selection of elite genotypes prior to release. This is important for the evaluations of the varieties across the sites so that selections will be made on the basis of performance of the varieties in different regions of the country.

212 **SB351.P3 NGI**
NGIRAZI, N.S.

Multi-location Intermediate Variety Evaluation Trials.

Abstract: The project is for evaluation and selection for better performing genotypes/lines.

213 **SB351.P3 NGI**

NGIRAZI, N.S.

Multi-location long season advanced Variety Evaluation Trials.

Abstract: The project is for evaluation and selection for better performing genotypes/lines.

214 **SB351.P3 NGI**
NGIRAZI, N.S.

Multi-location long season intermediate Variety Evaluation Trials.

Abstract: The project is for evaluation and selection for better performing genotypes/lines.

215 **SB351.P3 NGI**
NGIRAZI, N.S.

Multi-location Short season preliminary Variety Evaluation Trials.

Abstract: The project is for evaluation and selection for better performing genotypes/lines.

216 **SB351.P3 NGI**
NGIRAZI, N.S.

Unilocational long season preliminary variety evaluation trial.

Abstract: The project is for evaluation and selection for better performing genotypes/lines.

217 **S662.5 NIT**
NITROGEN applications on new cultivars and their n use efficiencies

Tobacco Research Board

Abstract: To evaluate cultivar responses to different rates of N application

218 **SF487.5 NKO**
NKOMBONI, D. GAVERA, M., SISITO, G., MUSARIRA, M. KUFA, M., TAVARERA, S.

Small grains as a supplementary feed for three strains of free ranging indigenous chickens.

Abstract: Productivity of chickens in the smallholder farming areas is low due to challenges related to the management. Farmers generally lack technical skills on the health, housing and feeding management of indigenous chickens. Most research efforts have been directed at the commercial production of broiler and layer chickens and therefore, information on indigenous chicken production is scant. Although free ranging chickens are expected to meet nutritional requirements through scavenging this is limited due to the temporal and spatial variation of feed resources availability. Feed is therefore the most limiting resource in indigenous chicken production. Chickens are not given enough feed for both maintenance and production because they are a sideline enterprise and are kept for subsistence purposes amongst other factors. It is against this background that the experiment has been designed to evaluate the different cereal crops as supplementary feed for the three strains free ranging indigenous chickens, namely: the naked necks, the spotted (isikhova, [Ndebele], chizizi [Shona]) and the red colored strain. Objectives of study are (i) to determine the live weight change of free ranging chickens supplemented with small grains during the dry season; (ii) to examine the nutrient composition of the crop contents of the chickens that are supplemented with whole grain during the dry season; (iii) to evaluate the carcass quality of chickens on different grain supplements and (iv) to determine the effect of supplementary feeding on the foraging behavior of chickens.

219 **SB950 NYA**
NYAMUTUKWA, S.

Biological control of important agricultural pests (Rearing of Natural Enemies).

Abstract: To make available environmentally friendly and sustainable control for pests. Where possible to avail these to farmers or make releases in selected agro ecosystems. The main objective is to rear natural enemies of: stem borers, red spider mites, aquatic weeds, Irish potato, helioverpa, diamond back moth, and armyworm.

220 **JL689.A2 NYA**
NYAUMWE, L J, MUTANDA, L, KUSURE, L P, KATSIKINDE, T J

Undergraduate Science Students' attitudes towards citizenship education: the case of Bachelor of Science students enrolled at Bindura University of Science Education

Bindura University of Science Education

Abstract: This study sought to answer the research question: What are the attitudes towards Citizenship Education (CE) of the Bachelor of Science (BSc) students pursuing undergraduate studies at Bindura University of Science Education (BUSE)? Questionnaires responses from 104 undergraduate students majoring in various science disciplines offered at BUSE revealed five themes of attitudes towards CE. The five themes of attitudes expressed by the undergraduate students were enjoyment, understanding, impact, status and personal benefits of CE. The students expressed views that they found the CE course to be enjoyable although they felt that it should be optional rather than a core course. One implication of the findings from the study for science instructional practice is that knowledge gained by student studying CE can provide them with a repertoire of examples from political, economic, historical and social contexts of Zimbabwe which may enhance their understanding of science concepts.

221 **G70.5 NYE**
NYELELE Charity

Spatio-temporal analysis of changes in biodiversity between 2000 and 2009 in a resettlement area, Chimanimani district, Zimbabwe

University of Zimbabwe

Abstract: Agricultural land expansion into forest areas is asserted to be a major driver of biodiversity changes (IUCN 2002) mainly through the process of forest fragmentation. In this study forest fragmentation is defined as a landscape process in which forest tracts are progressively subdivided

into smaller, geometrically more complex and isolated forest patches as a result of human land use activities, particularly agricultural expansion (Harris 1984). The way forest fragmentation affects biodiversity is a function of patch size and patch spatial configuration i.e. inter-patch distance and shape complexity. The degree of fragmentation due to agriculture is largely a function of the number of people engaging in agricultural activities, the rate of encroachment of these agricultural fields into forest areas, as well as whether people are practicing smallholder agriculture or large scale farming. For example, many people practicing either large scale or small scale agriculture are likely to fragment the landscape more compared with few people engaging in either large or small scale agriculture. Thus, agricultural encroachment tends to progressively reduce forest patch size.

It has been widely hypothesized that patch size is an important predictor of vegetation and wildlife species richness, wildlife patch occupancy, as well as vegetation species distribution patterns in a landscape (McGarigal and Marks 1994). Thus, variations in forest patch size due to agricultural field expansion are likely to have a significant impact on species richness. However, there is little information which estimates the nature and extent of this biodiversity change. Furthermore there is an assertion that the most recent stage of land redistribution in Zimbabwe, the Fast Track Land Reform Programme (FTLRP), which was initiated in June 2000 (Kaulem 2007), only considered use of the land for agricultural purposes, based mostly on the high intensity cropping. Information on the nature of forest biodiversity change due to agricultural expansion during the FTLRP in Zimbabwe is rudimentary and at most emotional. To this end, it is not straightforward to understand how the FTLRP impacted on forest biodiversity via agricultural expansion into forest areas based on current information generated on the programme. There is also a notion that the FTLRP neglected natural resource management and some natural resource production activities as legitimate land use options on newly settled farms (Moyo et al. 2004). Again, there is no empirical data that has been collected to test the effect of the FTLRP on biodiversity. Most studies have been at most speculative than factual on this subject (Eicher et al. 2006).

Most studies that have been conducted on biodiversity change due to forest encroachment have not been spatially explicit. This study therefore asserts that in order to understand the nature of these impacts, it is important to adopt and develop spatially explicit models. This study therefore integrates Remote Sensing (RS) and Participatory Geographic Information Systems

(PGIS) to characterize the dynamics of biodiversity and how it has been impacted on by agricultural expansion. Opportunities for increased community environmental awareness and participation in the sustainable utilization and management of forest resources have to be created (Kigenyi et al. 2002) and as such this study will engage communities to understand how biodiversity loss is differentially viewed in farming communities.

In view of the above, this study proposes a novel spatial approach to understand and explain the nature of the variations in biodiversity change based on concepts of the island biogeography theory, i.e. there is a near constant relationship between species richness, island size and island isolation (Wilson and MacArthur 1997). The theory not only offers a simple explanation for why species diversity varies according to island size and isolation, but it also provides a set of hypotheses on species richness that can be used to test the theory. The same principles of the island biogeography theory can also apply to an accelerating extent to formerly continuous natural habitats now being broken up by the encroachment of civilization. The study modifies the island biogeography theory to suit the agricultural landscape being studied by regarding forest patches as islands surrounded by a 'sea' of agricultural activity.

222

NYIKA, A

Popularization of Rhizobium inoculants in communal areas.

Abstract: Many farmers in the communal areas are not aware of Rhizobium inoculants especially in districts and provinces like Mashonaland East (Goromonzi) and Manicaland (Buhera) hence there is need to carry out field experiments in these two districts/provinces. The objectives are (i) to make communal farmers producing grain legumes aware of the cheap inoculants technology; and (ii) to determine optimum fertility regimes compatible with both rhizobium strains and legumes.

223

PARAWIRA, Wilson & KHOSA, Esther Mpandi

Biotechnology, research, development, applications and management in Zimbabwe: Review

University of Zimbabwe

Abstract: Information on the nature, trend and quality of biotechnology research, development, applications and management in a country is generally needed to improve policy decisions, guide future research and

QR82.R45 NYI

TP248.24 PAR

cooperation, civil society and general public knowledge, technology development agencies and to support public sector implementation of biotechnology research. However, there has been to date no comprehensive publication describing overall biotechnology research and development in Zimbabwe. The little information available only cover agricultural biotechnology in particular plant biotechnology.

This paper, therefore, offers a profile of Zimbabwe's overall biotechnology research and development covering activities that provide new knowledge, and the application of biotechnological techniques, biosafety and the regulation status of the biotechnology in the country. The aim is to provide an insight and update of the state of biotechnology in Zimbabwe. This paper also aims to highlight the country's strengths and weaknesses in biotechnology research and development capacity. This information will

help scientists, policy makers and regulators and other stakeholders understand the state of biotechnology in the country and serve to guide scientists who are interested in doing research in untapped areas of biotechnology in the country. Currently, Zimbabwe has a sizable number of research groups using biotechnology in a variety of areas. Current projects in agricultural biotechnology are mainly carried out at universities and public research institutes and are aimed at improving disease, herbicide, drought and insect resistance and for plant propagation. Especially plant tissue culture is widely used while work on genetic engineering is being carried in few laboratories. In food and beverages, biotechnological research is focused on microbiology and biochemical processes and use of starter cultures during fermentation of traditional foods. Zimbabwe is being involved in industrial biotechnology in a limited fashion, through search and use of her biological resources as sources of potential industrial enzymes. Biotechnological researches with environmental relevance include decolouration of textile dyes, wastewater treatment and biogas production from municipal, industrial and agricultural waste (water). It is found that Zimbabwe's biotechnology is mainly traditional and most

research organisations are applying less advanced biotechnology techniques. Poor infrastructure, lack of human resources and funding are the major challenges to modern biotechnology development in Zimbabwe, although biotechnology research development and management is more established in the country than in most of the sub-Saharan African countries. Zimbabwe has developed the legal framework to guide research and development of modern biotechnology through its National Biotechnology Authority Act (Act 3, 2006/ Chapter 14:31). However, there is still need

to develop a National Biotechnology Strategy if the country is to realise more benefits from biotechnology.

224 **TP248.24 PAR**
PARAWIRA, Wilson and MUCHUWETI, Maud

An overview of the trend and status of food science and technology research in Zimbabwe over a period of 30years

University of Zimbabwe

Abstract: In Zimbabwe there has been considerable research in food science and technology on the local foods ranging from fermented foods and beverages to fruits and vegetables. This paper reviews for the first time the status and trends in food science and technology research in Zimbabwe during the past 30years. Some of the notable original research findings from these researches are summarised, highlighting the status and development thereof and serving as guidance to scientists on what needs to be investigated further, for partnerships and for those who wish to develop the products to commercial products. An attempt is made to pinpoint significant research gaps, and the applications of the research in critically reviewing the research. Significant research has been covered in fermented milk, sorghum based foods and fruits. There has been work on the microbiology and biochemical changes from naturally fermented milks of Zimbabwe. The abundance of polyphenol-rich sorghums has sparked interest of food scientists in investigating effective methods of processing the available varieties so as to improve the acceptance and utilisation of sorghum for food and overall food security in Zimbabwe.

The potential antioxidant properties of phenolic acids found in indigenous fruits of Zimbabwe has stimulated research and there are reports of good antioxidant activities from some Zimbabwean fruits. There is little published information in scientific journals on the nutritional composition of the indigenous and traditional fruits and vegetables and other foods of Zimbabwe.

225 **TP248.24 PAR**
PARAWIRA, Wilson

The status and trends in food, industrial and environmental biotechnology research in Zimbabwe.

University of Zimbabwe

Abstract: Biotechnology offers industrial and environmental solutions through the use of living cells and/or their products to provide goods and services. This paper reviews for the first time the status and trends in industrial and environmental

biotechnology research in Zimbabwe for the past 25 years. An attempt is made to pinpoint significant research gaps, and the applications of the research in critically reviewing the research. Zimbabwe is pursuing an active research and development in food and industrial and environmental biotechnology. Some of the notable successes from these researches are summarized in this review serving as guidance to scientists on what needs to be investigated further, for partnerships and for those who wish to develop the biotechnology to commercial products. A number of enzymes with potential industrial and environmental applications have been isolated from untapped bio-resources in Zimbabwe. Some enzymes were purified and characterized and wait applications in the industry. Ethanol and biogas which are renewable energies can be produced by converting biomass using microorganisms. Much has been published on functional properties of mucilage and gum from plants in an attempt to facilitate the use of the polymers in industry. There have been some efforts to treat waste (water) using aerobic and anaerobic digestion into biogas and research to degrade dyes from textiles industry using enzymes from novel fungi. So far little has been done to apply much of the research findings in pilot and large-scale production systems.

226**LB1036.A6 PAS****PASHAPA, Petros**

An exploration of the extent to which domain projects can be used as a strategy for teaching art.

Abstract: This study arose as a response to the introduction of specialist art teachers in primary schools in the city of Gweru in Zimbabwe. It was intended to find the extent to which domain projects can prepare student teachers for their roles as teachers of art at different class levels in large primary schools where the teaching of one topic at a time would become impossible. Domain projects appear to be the solution. They enable learners to explore a much wider area in art working from a personally chosen topic as a starting point. They encourage learners to experiment, research and revise thereby making learning more learner centred. A class of 35 art main subject students was involved in the study. The study focused on whether students could identify a topic and explore it meaningfully and whether students could reflect upon their work. The researcher also wanted to find out the quality of artworks produced as a result of this approach as well as the students' ability to apply the same approach in primary schools. The findings were that; students tended to choose those topics they are familiar with, they were able to reflect upon their work and explore and experiment through drafts and portfolios. Students could more or less objectively assess their production and

reflection but overrated their perception. Students can also easily choose topics to teach in the primary school and sequence the content of the topics appropriately. A second cycle of the same study needs to be carried out with a different class and if successful, pilot studies could be carried out in collaboration with art specialist teachers in schools. It appears possible to apply the same approach in the teaching of Art at Primary School.

227**HA30.6 PIT****PITTIGLIO, Claudia, SKIDMORE, Andrew K., DE BIE, C.A.J.M., MURWIRA, Amon**

Common dominant scales emerge from images of diverse satellite platforms using the wavelet transform

University of Zimbabwe

Abstract: In this paper we investigated the scale dependence of spatial heterogeneity in multiresolution and multisensor data using the wavelet transform. The landscape analyzed with the wavelets retains the same dominant pattern irrespective of the original pixel size of the image. In agricultural areas, typically characterized by a mosaic of cultivated fields, the wavelet transform quantified consistently a median dominant scale of 512 m in the Orthophoto, Aster and ETM+. The dominant scale represented the dominant field size of cultivated areas. The shape of the average wavelet energy curves was also similar among the images. In seminatural areas the wavelet transform quantified consistently a median dominant scale of 128 m in the Orthophoto and Aster. The median dominant scale of ETM+ was slightly smaller and located at 64 m. We characterized the spatial heterogeneity of agricultural and seminatural areas in Andalucía (Spain) using multisensor data not time coincident ranging from 1 m (Orthophoto), 15 m (Aster) to 28.5 m (Landsat ETM+). The contrast in vegetation cover was measured using NDVI (in Aster and ETM+) and red band (in Orthophoto). We performed a multiresolution analysis using a Haar two-dimension Discrete Wavelet Transform to quantify and compare the intensity (maximum degree of contrast in vegetation cover), the dominant scale (the scale at which the maximum intensity occurs) and the wavelet energy curve (intensity plotted as a function of the scale) of different images at intervals of power of 2 within the scale range of 2 m and 4096 m

228**HF5549.5.S38 POS****POSEN, Clive F. & HARRISON, David E.**

A Longitudinal Study of Locus of Control in Zimbabwe's Business Sector

Human Resources Pvt Ltd

Abstract: Locus of control assessment in pre-employment selection testing indicates diminishing perception of “control over outcomes” in Zimbabwe business sector.

229 **SF95 POS**
POSHIWA, X, NGONGONI, N T, MANYUCHI, B, CHAKOMA, C, and TIGERE, A

The effect of plane of nutrition on the urinary purine derivative excretion in sheep and goats.

Grasslands Research Station

Abstract: The experiment was conducted to determine the effect of plane of nutrition on purine derivative excretion and to come up with model equations that relate to purine derivative excretion in sheep and goats. Four male Sabi sheep and four male Small-Esat African Goats, four months old were used. The trial was a 4x4 Latin square cross-over design to examine the response of purine derivative excretion to feed intake. The four diets consisted of star grass (*Cynodon nlemfuensis* CV. No.2) hay fed *ad libitum*, and at 85, 70 or 55 percent of *ad libitum*. Total purine derivative excretion increased with an increase in feed intake for both sheep and goats. However, the increases did not reach statistical significance ($P > 0.05$). The model equations relating digestible organic matter intake (x) to purine derivative excretion (y) were $y = 2.97X + 0.15$ ($R^2 = 0.72$) and $y = 5.86X - 0.33$ ($R^2 = 0.99$) for sheep and goats respectively.

230 **SF85 POS**
POSHIWA, X, LUNGU, L., AND GASHA, S.

The effect of ultra-high stocking density grazing management on long-term productivity of veld: a preliminary report

Grasslands Research Station

Abstract: In Zimbabwe there is little evidence to support claims by the Holistic resource management's school of thought that intensive grazing practices can lead to high livestock productivity and maintain veld condition. The aim was to find ways of reducing deterioration in condition of veld in communal areas and on some commercial farms. Hence, the study was designed to monitor and document the long-term effects of ultra-high stocking densities grazing management practices on veld condition and beef productivity. Participating farmers were Mr Johan Zeitsman of Karoi and Mr Hendrick O'Neill of Featherstone. Veld condition changes were monitored along fixed transects on six replications divided into three blocks according to vegetation status (poor, medium and good), on each property.

231 **HC79.E5 POS**
POSHIWA, X., MURWIRA, A., HEITHONIG, I., PRINS, H and VAN IERLAND, E.

Redressing Asymmetry in resource allocation through co-operation among diverse livestock and wildlife systems in South East Lowveld, Zimbabwe

Grasslands Research Station

Abstract: The project focuses on resources such as grazing and water in what is an arid area and with uncertain rainfall. Particular attention would be paid to issues of scale mismatches in resource management. Ecosystem and economic models will be used to explore various scenarios of resource allocation and management issues relating to cooperation and co management between parks and the surrounding communal lands

232 **SB945.A5 QUA**
QUANTIFICATION of yield losses due to aphid-transmitted virus diseases in different flue-cured tobacco cultivars

Tobacco Research Board

Abstract: To evaluate the open, limited and rationed release tobacco cultivars for their resistance to PVY and Bushytop and assess the associated losses in yield due to virus diseases

233 **SB608.T7 QUA**
QUATERNARY ammonium compound for the management of pythium root rot

Tobacco Research Board

Abstract: To investigate the efficacy of a Quaternary Ammonium Compound (Sporekill™) as a medium drench for the management of Pythium root rot on tobacco seedlings in the floatbed seedling production system and compare its efficacy to the standard metalaxyl treatment and establish the most effective rate.

234 **S631 REL**
RELATIONSHIPS among available soil nitrate, cured leaf nitrate and Leaf yield of new flue-cured tobacco cultivars

Tobacco Research Board

Abstract: To evaluate the relationships among available soil NO₃ and, P₂O₅ leaf yield, cured leaf NO₃ and residual soil NO₃ for selected tobacco cultivars.

235**SF396.5 RUK****RUKWAVA, Godfrey**

Influence of mutukutu (*Piliostigma thongil*) fruit inclusion level in pig diets or growth performance, carcass fruits internal parasite population and skin condition.

Grasslands Research Station

Abstract: Four diets will be formulated in which the inclusion level of nutrition will be differing. The pigs will be fed for 15 weeks and measurements on VF1, growth, feed conversion efficiency, internal parasite population and carcass traits will be recorded.

236**QR151 RUK****RUKWAVA, Godfrey**

Assessing and quantifying the amount of nitrogen that can be fitted into the soil by velvet bean within a season and extend to which legumes can replace inorganic nitrogenous fertilizers.

Grasslands Research Station

Abstract: Velvet bean will be intercropped with maize, soil samples will be taken before planting of any crop and no nitrogenous fertiliser shall be applied to the crops. At the end of the growing season, another set of soil samples will be taken. Total nitrogen content will be determined from the two given soil samples, NO₃ content will be quantified to their equivalence of the inorganic nitrogenous fertilizers.

237**SF99.C73 RUK****RUKWAVA, Godfrey**

Use of calliandra calothyrsus leaf meal as critical protein supplement to calves feed on cotton seed cake.

Grasslands Research Station

Abstract: Two groups of calves will be used in which there will be given a diet containing cotton seed cake as a protein source and the other group will be containing calliandra calothyrsus leaf meal. Growth performance will be noted and differences if any will be recorded.

238**SB117.4 RUK****RUKWAVA, Godfrey**

Effect of seed storage period on germination of *Stylo* and *Panicum maximum*.

Grasslands Research Station

Abstract: Seeds dating from 1956 to present day of *Stylo* and *Panicum* will be sowed and germination

will be recorded. This will give a range of years in which dominance of the above mentioned seed will be broken, the results will be compared with literature and if there are any exceptions, possible explanations will be given

239**SF99.C73 RUK****RUKWAVA, Godfrey**

Effect of banana stem (*ensente venricosta*) on growth performance, nutrient digestibility and microbial population in growing-finishing pigs.

Grasslands Research Station

Abstract: Two diets, one with banana stem material and the other with no banana will be fed to pigs and measurements on microbial population growth performance and nutrient digestibility will be recorded.

240**SB273 SCR**

SCREENING flue-cured tobacco varieties and breeding lines for aphid Resistance

Tobacco Research Board

Abstract: To screen different flue-cured tobacco varieties and landraces for aphid resistance

241**QL737.U5 SEN****SENDA, T.S., SIKOSANA, J.N.L., HWERU, A. DAGA, O**

The potential of local plants and herbs in reducing gastro intestinal parasites in small ruminants.

Abstract: Escalating costs and unavailability of antihelmintics has made it almost impossible to maintain a tailor-made dosing programme. On the other hand; antihelmintic resistance has become a serious problem in many countries and is now widespread particularly sheep. The loss of inexpensive drugs against helminthes due to problems of antihelmintic resistance may leave many communities without the means of controlling parasitism. Increased productivity in ruminants through the control of helminthes parasites will to a large extent depend upon the availability of low cost, effective antihelmintics, hence the need to probe into the use of locally available plants and herbs as antihelmintics. The study focus is (i) to assess the potential of local plants and herbs in reducing gastro intestinal parasites in weaners; (ii) to determine the optimum dosing rate that can be used for maximum reduction of gastro intestinal parasites and (iii) to investigate the effects of dosing with local herbs on weaner mortality and growth performance

242 **SF494 SHU**
SHUMBA, T. and MUGANHU, B.
 Use of cowpeas as an ingredient in broiler diets.

Henderson Research Station

Abstract: Cowpeas could be a cheaper substitute of conventional protein sources in broiler diets. The objective of study is to investigate the use of cowpeas to replace extracted soya in broiler diets.

243 **SF94 SIB**
SIBANDA Mbulisi

Evaluating the relative contribution of changing farming methods to habitat loss in the Mid-Zambezi valley, Zimbabwe

University of Zimbabwe

Abstract: In this study, we test whether we can significantly ($p < 0.05$) distinguish cotton (*Gossypium Hirstutum L*) from maize (*Zea Mays L*) and sorghum (*Sorghum bicolor*) in smallholder agricultural areas of the Zambezi valley, Zimbabwe using temporal MODIS 250m derived NDVI, over cotton, maize and sorghum fields. We also test whether it is at the green up onset, green peak or senescence onset when we can distinguish cotton from maize and sorghum. Results show that we can significantly ($p < 0.05$) distinguish cotton from maize and sorghum using MODIS derived NDVI at the time when the senescence onset of maize and sorghum coincides with the green peak of cotton. We conclude that cotton can be distinguished from maize and sorghum in spatially heterogeneous small holder agricultural areas using temporal MODIS NDVI. The results are an important step towards mapping different crop types in smallholder agricultural areas using satellite remotely sensed data. Next, we test whether it is cotton or cereals that are more responsible for habitat conversion in the valley.

244 **SF380.7 SIK**
SIKOSANA, J.L.N., SENDA, T.S., DAGA, O,
HWERU, A.

Goat production systems: effects of all year round mating on the performance of goats under semi extensive production system.

Abstract: Rural livestock productions systems need a re-look so as to increase off-take. Scarcity of information on these systems (goat production) affects the extension delivery system. Twenty years after independence, goat production has not lived to its expectations. There is high kid mortality in most of the flocks; hence no meaningful off take has been realized. Research has to investigate or find out solutions to uncontrolled breeding in most of the flocks. Solutions could include improved

animals husbandry and nutritional interventions during the year.

245 **GN476 SIT**
SITHOLE, Pindai M

An exploratory study of indigenous knowledge systems and traditional practice of Nhimbe in view of how it contributes to sustainable community development in the context of Zimbabwe.

Unique Methods Consultants (Pvt) Ltd

Abstract: Nhimbe is a collective traditional indigenous knowledge systems and practice widely practised in Sub-Saharan Africa including Zimbabwe and it is an intellectual property of everyone in the community (Chiefs Gambiza, Mlevu, Musikavanhu, and Mutema; Prof. Mararike). Nhimbe is a form of community collective effort and it is known by different names in Sub-Saharan Africa. The terms Nhimbe and Ilima are used by the Shona and Ndebele people respectively in Zimbabwe. As a collective community development model, members of a community, regardless of sex and age, agree to collectively help one another in a diversity of tasks. In helping each other, people harness the local expertise, knowledge, and wisdom to benefit the individual households and community at large

246 **SH159 SIW**
SIWELA A.H., NYATHI C.B, and NAIK Y.S
 Metal accumulation and antioxidant enzyme activity in *C. gariepinus*, Catfish, and *O. mossambicus*, Tilapia, collected from Lower Mguza and Wright Dams, Zimbabwe. (2009)

National University of Science and Technology

Abstract: The aim of this study was to measure antioxidant enzyme activities as biological indicators of pollution in tissues of two species of fish. Five *Clarius gariepinus* and three *Oreochromis mossambicus* were collected from Umguza Dam (polluted dam) whilst seven *C. gariepinus* and eight *O. mossambicus* were collected from Wright Dam (relatively pristine dam). Diphosphotriphosphodiaphorase and catalase activities were consistently lower ($42 \pm 2\%$ and $78 \pm 20\%$, respectively) in liver whilst malondialdehyde levels were two times higher in muscles of both species of fish collected from Umguza Dam. However, seleniumdependent glutathione peroxidase (Se-GPX) activity was elevated four-fold in liver and gills of *O. mossambicus* collected from Umguza Dam. Metal levels were two to five times higher in muscles of both species of fish collected from Umguza Dam. Fish from Umguza Dam seem to have responded to pollution by increasing Se-GPX specific activity in

an effort to detoxify peroxides produced as a result of metal induced oxidative stress.

247

QH96.5 SIW

SIWELA, A.H.

Some ecotoxicological aspects of selected freshwater bodies around Bulawayo

National University of Science and Technology

Abstract: Active and passive biomonitoring of four dams around Bulawayo were performed. Heavy metal and pesticide residue content were measured in sediment, water, floating and non floating plants and two species of fish, *C. gariepinus* and *O. mossambicus*, collected from the four dams. Also measured were antioxidant enzyme activity and MDA content in the fish, *C. gariepinus*, a benthic species, and *O. mossambicus*, a pelagic species, collected from the dams. The dams were chosen to include Umguza Dam - a traditionally polluted dam fed by domestic effluent, industrial effluent and sewage works effluent; Umzingwane Dam - one of the sources of drinking water for Bulawayo City; Wright Dam - a privately owned dam on a private farm and Matopo Dam - a dam used mainly for recreation. In general, it was found that sediment contained higher metal and pesticide residues than water and non-floating plants contained higher levels of metal and pesticide residues than floating plants. *O. mossambicus* bioaccumulated higher metal and pesticide levels when compared to *C. gariepinus*. There was occasional gender dependence of metal accumulation with females accumulating more metals than males. Except for Cd, the levels of metals in the fish were within the maximum residue limits recommended for human consumption. The relatively high levels of Cd however, were within the daily intake levels recommended by WHO hence do not pose a risk for human health. The antioxidant enzymes, CAT and Se-GPX as well as MDA concentrations were consistently higher in gills of *O. mossambicus* compared to *C. gariepinus*. The higher oxidative challenge caused by the higher metal body burden in *O. mossambicus* resulted in higher antioxidant enzyme activities and in higher MDA - an indication that the fish were in danger of lipid peroxidation. In other experiments, snails, *Lymnaea natalensis*, were exposed to sediment and water collected from four different sites in each of the four dams for 30 days. Heavy metals, pesticides and antioxidant enzyme activities were determined in tissues of the snails. No pattern could be established in terms of the order of metal bioaccumulation in the snails exposed to sediment and water collected from different sites in the dams. However, Fe was the most bioaccumulated metal in snails exposed to sediment and water collected from Umguza Dam and Umzingwane

Dam whilst Ni and Cu were the most abundant in those snails exposed to sediment and water collected from Matopo Dam and Wright Dam respectively. The high levels of Cu in snails exposed to sediment and water collected coincided with highest mortality of snail (59%) in Wright Dam. Ni was the most bioaccumulated metal in snails exposed to Matopo Dam and this coincided with the lowest mortality rate of 7% indicating that Ni might have limited toxicity in snails. Cd was the least bioconcentrated metal in snail tissue in all dams other than in snails exposed to Wright Dam sediment and water. Bioaccumulation of metals by non-floating plants was greater than that of floating plants. There were occasional but not consistent site-related differences in the antioxidant enzyme activities (catalase, glutathione peroxidase and DT-diaphorase) in snails exposed to different sites of the dams. In one dam (Umzingwane) no differences in the antioxidant enzyme activities could be found in snails exposed to the four different sampling sites. Overall, this study confirmed some laboratory based observations whilst also showing that a simple relationship between pollution and antioxidant enzyme activity in different tissues of fish in the field may not be possible.

248

RA644.M2.Z56 SMI

SMITH, Robert J. and HOVE-MUSEKWA, Senelani D.

Determining Effective Spraying Periods to Control Malaria via Indoor Residual Spraying in Sub-Saharan Africa (2008).

National University of Science and Technology

Abstract: Indoor residual spraying—spraying insecticide inside houses to kill mosquitoes—is an important method for controlling malaria vectors in sub-Saharan Africa. We propose a mathematical model for both regular and non-fixed spraying, using impulsive differential equations. First, we determine the stability properties of the nonimpulsive system. Next, we derive minimal effective spraying intervals and the degree of spraying effectiveness required to control mosquitoes when spraying occurs at regular intervals. If spraying is not fixed, then we determine the “next best” spraying times. We also consider the effects of climate change on the prevalence of mosquitoes. We show that both regular and nonfixed spraying will result in a significant reduction in the overall number of mosquitoes, as well as the number of malaria cases in humans. We thus recommend that the use of indoor spraying be re-examined for widespread application in malaria-endemic areas.

249 **SB945.A5 SPA**
The SPATIAL and temporal distribution of the red and green morphs of the tobacco aphid in Zimbabwe

Tobacco Research Board

To determine the distribution of the red morph of the tobacco aphid in the tobacco growing districts of Zimbabwe

250 **QL527.A64 STU**

STUDIES on the development of myzus nicotianae at elevated temperatures.

Tobacco Research Board

Abstract: To study fecundity and development of the red and green morphs of *Myzus nicotianae* on fluecured tobacco at elevated temperatures.

251 **G70.5. TAG**
TAGWIREI MAREDZA Caroline

A remote sensing method for estimating Net Primary Productivity (NPP): a Zimbabwe case study

University of Zimbabwe

Abstract: The estimation of net primary productivity (NPP) is important in the global carbon budget analysis. Thus, mapping its distribution is necessary for enhancing our understanding of the functioning of ecosystems. The main objective of this study was to estimate the NPP in Zimbabwe, as well as analyse its distribution by eco-region. NPP is a product of absorbed photosynthetically active radiation (APAR) and light use efficiency (LUE) and in this study, estimated APAR using a radiation model based on a digital elevation model. We also estimated LUE using a remotely sensed index called the photochemical reflectance index (PRI). Our results show that NPP levels are significantly ($p < 0.05$) different among Zimbabwe's five eco-regions. The Eastern Highlands showed the highest mean NPP of $28 \text{ t}^{-1} \text{ ha}^{-1} \text{ yr}^{-1}$ with the lowest annual NPP of $18 \text{ t}^{-1} \text{ ha}^{-1} \text{ yr}^{-1}$ particularly in the Kalahari and Save-Limpopo eco-regions. Our results further show that there is no significant ($p > 0.05$) difference in the mean annual NPP between the Central and Zambezi as well as the Kalahari and Save-Limpopo eco-regions. Based on these findings, we concluded remotely sensed PRI and APAR derived from radiation models can be useful in estimating NPP. However in this study, we did not take into consideration the effects of clouds when estimating APAR which may have affected the precision of our NPP estimates.

Nevertheless, we feel that the method used in this study for estimating NPP is invaluable for the periodic update of the national inventory on carbon sinks. This is a useful way for Zimbabwe to meet her obligations under the United Nations Framework Convention on Climate Change.

252 **SF197 TAM**
TAMBO, G., MATSHE, F., SISITO, G., MAMBWERE, S. MKHWANANZI, T.

Cattle population dynamics in agriculture: case study Matopos Research Station

Matopos Research Station

Abstract: Study is to analyse cattle trend since 1995-2004, identify explanations to differences in cattle dynamics in years 1995-2004. We need to forecast future values of cattle populations for possible future (e.g. destocking or restocking) decisions.

253 **SF191.A43 TAM**
TAMBO, G., MATSHE, F. NDLOVU, R., SISITO, G.

Conservation of the Brahman breed.

Abstract: It is fundamental to conserve genetic material for future use (sustainable use of resources). The pure herd can be maintained as the parental herd which can be used for different crossbreeding trials. The objectives of the study are: (i) to conserve the Brahman breed; (ii) to multiply the Brahman breed and (iii) to improve the Brahman breed through selection.

254 **SF191.A43 TAM**
TAMBO, G., MATSHE, F. NDLOVU, R

Conservation of the Brahman herd

Abstract: It is fundamental to conserve genetic material for future use (sustainable use of resources). The parental herd can be maintained as the parental herd which can be used for different crossbreeding trials. The objectives of the study are: (i) to conserve the Brahman herd at Matopos; (ii) to multiply the Brahman herd

255 **S633 TAU**
TAURO, T.P.

Population dynamics and management response of N₂-fixing indigenous legumes for soil fertility restoration in smallholder farming systems in Zimbabwe.

Makoholi Research Station

Abstract: Following cycles have been revealed to be too short to build up soil fertility to a level that can sustain meaningful crop production.

Addressing soil fertility challenges for smallholder farmers of Southern Africa require new technical innovations drawing more from indigenous knowledge and resources. The objectives are (i) to monitor/capture part of the succession under 1- and -2 year indifallow systems under different rainfall conditions on nutrient depleted sandy soils; (ii) to determine N₂-fixing capacity of indigenous legumes under field conditions; (iii) to determine the influence of P application on population dynamics (species composition), N₂-fixation capacity and biomass productivity of indifallow system; and (iv) to determine the influence of 1-year and 2-year indifallow on soil P availability following RP application.

256 **S539.S8 TAU**
TAURO, T.P., MANYEVERE, A, MAZULU, A., MURWIRA, M.

Sugar bean response to different rhizoidal inoculation rates and fertilization on selected sandy soils of Zimbabwe.

Grasslands Research Station

Abstract: Sugar bean is a challenge to maximize yields with the current strains and inoculation rates. It has a good protein source and is a cash crop as well. Therefore, maximization of yields would bring multiple benefits. The objective is to improve sugar bean yield with inoculation and fertilization.

257 **S667.F6 TER**
TERERAI, B.

Evaluation of *Vigna vexillata* for herbage yield, quality and seed production.

Henderson Research Station

Abstract: Forage legumes can augment feed resources for livestock production during the dry season and they can be conserved as hay or silage. They have a better crude protein than grasses hence they have a potential to be used as supplements during this period.

258 **S635 TER**
TERERAI, B.

The potential use of home-made liquid manure as a nitrogen source in the production of star grass CV No 2 (*Cynodon nlemfuensis*).

Henderson Research Station

Abstract: The use of inorganic fertilizers and other chemicals in some instances resulted in the contamination and pollution of the environment, sometimes finding their way into the food chain, causing detrimental effects. Alternative sources of soil fertility such as inorganic fertilizers may have

less environmental damage and may also be more accessible to farmers. The production of star grass heavily depends on huge applications of inorganic nitrogenous fertilizers. Liquid manures concentrate the little nitrogen found in organic animal manures

259 **S631 TER**
TERERAI, B.

The productivity and ecology of grazed multi legume reinforced grass pastures.

Henderson Research Station

Abstract: Higher fertilizer requirement in permanent pastures has rendered animal production using nitrogen fertilized pastures expensive due to the cost of inorganic fertilizers. It has also contributed to poor herbage as a result of inadequate fertilizer applications. Legume reinforcement seeks to improve herbage quality and utilize the legume to fix nitrogen. The objective is to reduce the use of inorganic fertilizers in nitrogen fertilized grasses by reinforcing with forage legumes.

260 **SF209.5 TIG**
TIGERE, A, CHAKOMA, C and MAGWENZI, M.

The use of cereal-legume silages and urea-treated maize stover as dry season supplements for cattle grazing natural pastures in Wedza and Buhera Districts of Zimbabwe

Grasslands Research Station

Abstract: Two silage diets and urea treated maize stover were offered as supplements to indigenous cattle grazing natural pastures. One silage comprised a mixture of maize (*Zea mays*) with velvet bean (*Mucuna pruriens*) and the other silage comprised sorghum (*Sorghum bicolor*) with velvet beans. Twenty seven cattle of mixed sexes were fed the three diets and a further group of nine animals served as a control. All animals grazed communally during the day and were kraaled overnight. Supplements were given in the morning before the animals were let out for grazing. The animals were given supplements between August and November. Animals given no supplements lost weight significantly ($P < 0.05$) and this trend was common across sites. Urea treated maize stover was consumed more than the silage diets and the differences were significant at two of the three sites. Differences in intake and weight changes between animals given the maize and sorghum silage were small and not significant. The results suggest that maize-velvet bean, sorghum-velvet bean silages and urea treated maize stover can be used effectively as dry season supplements for cattle grazing natural pasture in communal areas.

261 **SF209.5 TIG**
TIGERE, A T AND MAGWENZI, M.
 Utilization horticultural crop residues in ruminant livestock feeding: use of paprika calyx a supplement to poor quality roughages

Grasslands Research station

Abstract: Due to rising costs of commercial livestock feeds in Zimbabwe, there is need to continuously seek alternative feeds that are cost-effective for sustainable ruminant livestock production. Most smallholder and large-scale farmers depend on poor quality cereal crop residues as a livestock feed during the dry season. However, low nitrogen levels and high fibre content limit use of cereal crop residues. A few farmers improve the nutritive value of crop residues by chemical treatment prior to feeding due to high costs. The use of legume forages is limited by their yield and competition between man and animals as feed. With the marked increase in paprika production from 200tonnes in 1991 to 50 000tonnes in 2000, the crop residue in form of calyx has become a potential livestock feed source. The objective of the study was to determine the *In Vitro* dry matter digestibility (DMD) and *In sacco* dry matter degradability of maize cobs supplemented with three levels (10%, 20%, 30%) of paprika calyx and urea treated maize cobs. The untreated maize cobs were the control diet. The design of the experiment was a completely randomized design. Four rumen cannulated Tuli x Jersey cattle crosses (6years, weighing 540kg) were used. The feed samples were ground through a 3mm screen. Three-gramme samples were weighed into nylon bags in duplicate and placed in the rumen of fastulates. The incubation times were 3, 6, 12, 24, 36, 48 and 96hours. After removal from the rumen, the bags were washed under running water and dried for 48hours at 60°C. DMD was determined according to Tilley and Terry (1963) and chemical analysis according to A.O.A.C. (1990).

There were significant differences in DMD and N ($P<0.05$) in the diet with 30% paprika calyx and the untreated maize cobs. However, the differences were not significant in these parameters between 20% paprika calyx and the diet with 30% paprika calyx. There was also no significant difference between the urea treated maize cobs and diets threr in DMD. Dry matter loss at 48hrs in the rumen and the degradability constant b was highest in diet three which was only significantly different from diet one and the control diet. Therefore paprika calyx is a potential supplement to poor quality roughages such as maize cobs and maize stover at inclusion levels of 30% especially when legume hay, good quality forage grass or urea may be limiting.

262 **SB951.4 TOB**
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION
 Assessment of a new source of alachlor and metolachlor for weed Control efficacy in tobacco.

Tobacco Research Board

Abstract: To assess the efficacy of new sources of active ingredients of Alachlor and Metolachlor for weed control in tobacco production, against the local standard products.

263 **SB608.T7 TOB**
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION
 An assessment of the weed control efficacy and phytotoxicity to Tobacco of a new sources of command and sulfentrazone

Tobacco Research Board

Abstract: To assess the efficacy of new sources of command and Sulfentrazone for weed control in tobacco production, against the registered standard products.

264 **SB276 TOB**
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION
 Effect of Borregro on tobacco seedling growth, development and Quality

Tobacco Research Board

Abstract: To determine the efficacy of BorreGRO in enhancing tobacco seedling growth, development and quality.

265 **SB951.4 TOB**
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION
 Evaluating command for use in the tobacco float seedling production system.

Tobacco Research Board

Abstract: To evaluate the efficacy and establish appropriate rates and timing of application of the herbicide Command for weed control in the tobacco float seedling system.

266 **SB273 TOB**
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION
 Evaluating command and fusilade super combinations for use in the Tobacco float seedling production system.

Tobacco Research Board

Abstract: To evaluate the efficacy and establish appropriate rates and timing of application of a Command-Fusilade Super combinations for weed control in the tobacco float seedling system.

**267 SB951.4 TOB
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION**

Evaluating fusilade super for use in the tobacco float seedling production system

Tobacco Research Board

Abstract: To evaluate the efficacy and establish appropriate rates and timing of application of the herbicide, Fusilade Super for weed control in the tobacco float seedling system.

**268 SB276 TOB
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION**

Influence of planting date, fertiliser management and topping height on Canopy reflectacy and yield of flue cured tobacco varieties

Tobacco Research Board

Abstract: To assess spectral separability of flue cured tobacco varieties, establish the effect of fertilizer management and topping height on spectral separability of flue cured tobacco varieties and develop spectral techniques for use in predicting tobacco leaf chemical composition and potential yield.

**269 SB276 TOB
TOBACCO RESEARCH BOARD, CROP
PRODUCTION DIVISION**

Influence of variety, topping height and nitrogen application on tobacco yield and quality

Tobacco Research Board

Abstract: To establish the effect of varying topping heights and levels of nitrogen on the yield and quality of limited release cultivars in comparison with the standard KRK26.

**270 SB273 USE
The Use of biological pesticides for the control
of the tobacco moth *Ephestia elutella* and
tobacco beetle *lasioderma serricornis***

Tobacco Research Board

Abstract: To evaluate the efficacy of Neem-Azal for the control of the tobacco moth and the tobacco beetle in the laboratory.

**271 S631 USE
USE of foliar15 fertilizer in tobacco float system**

Tobacco Research Board

Abstract: To assess the efficacy of a Foliar15 fertilizer in tobacco float system

**272 TJ248 WAK
WAKASEMWA, Davison and CHIRINDA,
Ngoni**

Design of a Mechatronic Grinding Mill

Harare Institute of Technology

Abstract: This project consists of two system designs. The two system designs are as follows:-

1. Mechanical system design. This part of design is mainly targeting increase of the reliability of the grinding mill, increase of the machine efficiency . This would be achieved by proper machine element design and elimination of oscillatory and impact loads which are present during machine operations.
2. Control system design. This aims at optimal power utilization and prevents abuse of the machine and the society by the grinding mill operators. This type of the grinding mill will have user interface, that would be used to communicate with the public and memory that would communicate with the owner of the business.

**273 G70.3 ZEN
ZENGEYA Fadzai**

Understanding the spatial distribution of cattle at the wildlife-livestock interface using real time Global Positioning system and satellite remotely sensed data

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Abstract: Interaction between livestock and wildlife at the periphery of wildlife areas has been widely hypothesized to be the cause of diseases among livestock, particularly cattle in Africa. However, the interaction between cattle and wildlife in these areas has not been quantified spatially, leaving the abovementioned hypothesis largely untested. In other words, the problem of failing to test the hypothesis in Africa has been the lack of basic field data that would lead to the testing of this hypothesis as an explanation for cattle diseases occurrence in the periphery of wildlife areas (Kock, 2002). Lack of data on the spatial interaction between wildlife and livestock is a result of challenges that scientists have had to capture and analyze real-time two-dimensional distributions of wildlife and livestock. Radio

collars have been used for this task. However, there are limitations in using these because they result in low accuracies in animal positioning as they do not transmit the exact latitude and longitude of an animal's position. In addition, data transmission is also easily affected by weather and light. Therefore, it is important to develop methods that result in high positional accuracy if animal movements have to be accurately understood.

Recent advances in global position system (GPS) technology have allowed development of lightweight GPS collar receivers suitable for monitoring animal positions at short time intervals (Turner 2001). This has been coupled by the development of satellite remote sensing technology and classification algorithms which have provided a source of data to classify habitat variables. These data can then be analyzed in a GIS environment to understand the spatial patterns of animal movement in relation to their habitat, as well as in relation to human decisions. Such analyses result in information on the species home range and its determinants, as well as provide an opportunity to identify areas of wildlife and livestock range overlaps and otherwise.

Studies that have utilised GPS tracking for monitoring cattle movement are few. Turner *et al.*, (2001) studied cattle movement on pasture in relation to slope and aspect whilst Tomkins *et al.*, (2007) used GPS data to assess grazing impact on pasture as a way to adjust stocking rates. It is important to note that the abovementioned studies have been conducted on small spatial scales. Moreover, the common characteristic with these studies is that they focused on paddocks and not on free range cattle. Most studies on free range animals focused mainly on wildlife (i.e. Ryan *et al.*, 2005; Kernohan, 1998). Therefore it is important to complement these studies by focusing on free range cattle tracking, as well as understand their habitat utilization patterns at different scales in the landscape, as well as understand human influence on the ranging pattern.

This study aims at describing and quantifying the spatial movements and distribution of cattle in wildlife periphery areas, as well as to understand the extent to which this distribution is a function of habitat variables or cattle owner decisions. It also seeks to determine whether there is an interaction/overlap in habitat use with wildlife. This study is the first step to testing whether there is a relationship between wildlife borne diseases and cattle diseases. Linking the spatio-temporal distribution of cattle herds at the periphery of the wildlife-rich areas with variations in the prevalence of wildlife borne diseases in these cattle herds is a first step towards the identification of pastoral

practices that will lower the risk of infestation. The results will also help in designing appropriate management practices that will ultimately meet both development and conservation objectives.

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Waterhole use by wild and domestic ungulates at the wildlife-livestock interface: The case of a semi-arid region landscape, South Eastern Lowveld, Zimbabwe.

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G70.5. Z56 ZVI

Abstract: Water is an important resource for the survival of ungulates, both domestic and wild. In seasonal climates such as those found in Zimbabwe, the rainy season is characterized by an abundance of water sources while in the dry season, most water sources dry up resulting in water shortages. Thus, it is reasonable to hypothesize that both domestic and wild ungulates are distributed freely in rangelands during the wet season while during the dry season ungulate distribution is hypothesized to be constrained by surface water availability (Ayeni 1979, Redfern *et al.* 2003). To adequately test this hypothesis, knowledge of the distribution of water during both the wet and dry seasons in the rangeland is needed. But, to date little is known about how surface water variability affects the distribution of both wild and domestic ungulates in rangelands (Ayeni 1975). Therefore, there is need to investigate the variability of surface water in rangelands and how it affects the spatial and temporal distribution of wild and domestic ungulates in these seasonal climates.

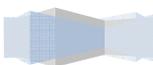
It is during the dry season that it is hypothesized that the scarcity of water resources would lead to more intensive competition between livestock and wildlife rangelands compared with the wet season especially at water holes (Makhabu, ???). However, knowledge on the nature of this interaction between livestock and wildlife at waterholes spatially during both the wet and dry season, as well as diurnally is still not well documented. Thus, there is need to develop methods to determine dynamics in the spatial distribution of waterholes over time, as a way to provide a template upon which the interaction between wild and domestic ungulates can be characterized.

Remote sensing is an invaluable source of data to determine the spatial distribution, as well as the temporal dynamics in natural resources including water resources. However, to the best of our knowledge, the application of remote sensing to mapping the distribution and determining temporal dynamics in water availability in rangelands in

seasonal climates is still rudimentary. Thus, it is important to test the applicability of remote sensing methods in mapping spatial and temporal dynamics in waterholes in semi-arid regions as a preamble to testing the hypothesis of the nature of wild and domestic ungulate interaction at waterholes.

In this, study we will determine the spatial distribution, as well as the temporal dynamics in permanent and ephemeral waterholes in the South Eastern Lowveld of Zimbabwe (SELZ) using Remote Sensing. In addition, we will test whether the distribution of permanent, ephemeral, natural and artificial waterholes affects the distribution of wild and domestic ungulates in rangelands of the SELZ.

Lastly, we will characterise the nature of interaction between domestic and wild ungulates in space and time, i.e. seasonally and diurnally. The outputs of this study will be useful in providing background knowledge necessary for testing the hypothesis that contact between wild and domestic ungulates at waterholes intensity of disease transmission pathways between wild and domestic ungulates.



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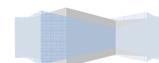
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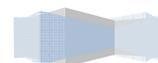
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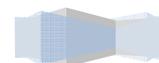
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