
Regional Scientific Data Management and Learning Workshop for PhD Students and Staff

*Strengthening Research skills and creativity among PhD
students in RUFORUM Regional PhD Programmes*

REPORT

Resource Persons

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PARTICIPANTS AND THE RESOURCE PERSONS



Professor Kwapata, Facilitators and Participants in the Scientific Data Management and Training Workshop

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1.0 INTRODUCTION

1.1 Background

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) Strategic Plan, 2006-2011 has a major thrust of strengthening research capacity of African Agricultural Research Systems through training of high quality graduates. As part of this thrust, RUFORUM in 2009 launched five Regional PhD programmes: (1) Plant Breeding and Biotechnology, hosted by Makerere University (Uganda), (2) Dry lands Resource Management, hosted by the University of Nairobi (Kenya), (3) Soil and Water Management, hosted by Sokoine University of Agriculture in Tanzania, and two hosted by Bunda College of Agriculture, a constituent College of the University of Malawi, namely, (4) Agricultural Resource Economics and (5) Aquaculture and Fisheries Sciences. These programmes received funding support from various sources including the national governments, Rockefeller Foundation, Alliance for a Green Revolution in Africa (AGRA) and ***International Development Research Centre (IDRC)***.

The students in these five PhD programmes have undergone training within their respective universities. They are currently conducting research on various topics linked to contributing to improving productivity and incomes of small-scale farmers and providing data/evidence to support policy formulation and implementation. An opportunity was created by RUFORUM for these students to come together, to reflect on the training, research and learning outcomes. The retreat at Bunda University College of Agriculture had a theme "Enhancing research quality and learning for improved PhD training in the Eastern, Central and Southern Africa region". The retreat was organized with support from Bunda College of Agriculture, the NEPAD Fish Node, IDRC, and the EDULINK Project. The participants were at different stages in their PhD research work. Some were in the early planning stage of field work, others were collecting data, conducting analysis, and a few were in the writing stage. The structure of the training recognized these stages and responded accordingly.

1.2 The Importance of the Training

Research is conducted to investigate, confirm or disapprove effect of effects. To do so requires collecting, summarising, analysing of data, presenting and interpreting results about a population of interest. The decision-makers require information based on facts in order to develop viable policies. To make sound decisions, quality information must be timely, accurate, relevant, adequate and

readily available whenever needed. Statistics becomes important in transforming raw data into meaningful and useful information for decision-makers. It supports the decision-making process by strengthening the quantifiable basis from which to make a well-informed decision. The PhD students need statistical analysis skills in order to provide critical information required for policy formulation and publication of results in scientific journals. Lack of such skills at this stage has been identified as major drawbacks in Sub-Saharan Africa. The students need these skills to develop research proposals, design experiments/ surveys, analyse and interpret results. Another weakness cited is in organizing, managing, and analysing data, interpreting the results in a scientific way and communicating this information to the stakeholders, including policy makers.

1.3 Aim of the Training

This course aimed at providing PhD students involved in agricultural research systems under RUFORUM, with additional skills to design, collect, manage, analyse and present results emanating from their data. The ultimate aim was to improve the efficient flow of agricultural information and research efficiency.

1.4 Objective of Training

With the foregoing in mind, the primary objective of this training was to equip PhD students with the skills and knowledge in software use (GenStat & SPSS) in data analysis and presentation of results in a format that would ensure their wide dissemination as peer reviewed publications and policy formulation. A related objective was to give opportunities to PhD students to finalize or improve on their draft publications.

1.5 Learning Outcomes

The key learning outcomes were to:

- understand and apply qualitative data analysis; correlation & regression analysis; multivariate techniques; categorical data analysis techniques; mixed (REML) models procedures and generalised linear models
- use statistical software to describe, analyze and model the state of a biological or agricultural system in both a quantitative and qualitative manner

- be able to design an experiment and survey studies and also choose the correct statistical method for their data

1.6 Expected Output

Overall:

The main expected outcome from this training was to minimize use of inappropriate statistical methods on data analysis and to encourage publications to peer-reviewed journals.

Specific:

At the end of training the participants will be able to:

- handle data analysis for their PhD work and complete writing of dissertation within specific time frame;
- communicate statistical findings effectively ;
- share ideas that enhance application of statistics in agricultural production systems;
- publish research findings in peer-reviewed journals and effective in disseminating these results for use by stakeholders.

1.7 Assumption

It had been assumed that participants had basic knowledge in statistics and that they had access to laptops with appropriate software.

2.0 PARTICIPANTS AND RESOURCE PERSONS

2.1 Participants

The participants were all PhD students under the RUFORUM in the five research programmes, namely, plant breeding and biotechnology, dry lands resource management, soil and water management, agricultural resource economics and aquaculture and fisheries sciences. They originated from different countries, namely, Kenya, Zambia, Malawi, Rwanda, Uganda, Tanzania and Ethiopia, The coordinators of each of the programme accompanied the participants. The students were at different stages in their studies. Some were continuing PhD students who had completed coursework and were currently undertaking research. The list of participants and individual PhD topics are provided (**see appendix I**).

2.2 Resource Persons

A team of four professional trainers were involved, namely, Dr Peter Njuho from Human Sciences Research Council, South Africa, Dr Susan B Tumwebaze, Makerere University, Uganda, Dr Tasokwa Kakota and Dr Timothy Godwe both from Bunda University College, Malawi. All the four trainers participated in a Training of Trainers (TOT) workshop that was organised and funded by Centre for Technical and Rural-Agriculture (CTA), and RUFORUM, held on 16th to 27th August 2010 at the Imperial Resort Beach Hotel, Entebbe, Uganda. The workshop addressed problems related to data management and analysis, encountered by research scientists from the Eastern, Central and Southern African Countries.

2.3 Venue and Dates

The training was held from 14th to 18th November 2011 at the Bunda University College, Malawi. Whilst the trainers and coordinators were household elsewhere, participants were all within the college. Residing all together had an added advantage of participants meeting in the evening and carrying on with discussions and practicals. Except for the power irregularities, the training facilities, environment for learning and interaction between participants and organisers were good. Availability of power generator resolved the power interruption problem.

3.0 OPENING CEREMONY

3.1 Opening and Setting the Scene

In the opening ceremony we had Professor Moses Kwapata, the Principal, Bunda University College of Agriculture, Malawi, as the guest of honour, Dr George Matiya, Dean of Faculty of Environmental Sciences, as master of ceremony and Dr Jeremiah Kang'ombe, the coordinator, PhD in aquaculture and fisheries Sciences, offering the opening prayers. In his welcome remarks, Dr Matiya extended his gratitude to the guest of honour for his continued support and commitment to RUFORUM initiated PhD programmes and training. He indicated the purpose for the training as to equip PhD students with knowledge and skills and share experience and knowledge in data management and analysis. The participants were urged to interact and share experiences in data handling, management and analysis. Participants introduced themselves and gave the programmes they are undertaking. The coordinators of the PhD

programmes at Bunda College presented the progress made by the students and also an overview of the programmes.

3.2 Dr Jeremiah Kang'ombe, Coordinator, PhD in Aquaculture and Fisheries Sciences

Dr Kang'ombe gave the background and progress for Aquaculture and Fisheries Sciences programme. The programme started in 2009 with students from Malawi, Tanzania, Kenya, Uganda and Zambia and has duration of three years with one year of course work and two years for research component. Students had completed course work and were in their 2nd year of research. Students have one more year and are progressing well. Dr Kang'ombe appreciated the contribution of RUFORUM and Bunda College in the facilitating the progress of the programmes even when there was no donor funding. The funds were coordinated well but challenges in getting the remaining money for tuition, stipend and students' research are there. Students were encouraged to continue working hard in order to complete on time.

3.3 Dr Mar Phiri, Coordinator, PhD in Agricultural and Resource Economics

In his remarks, Dr Phiri mentioned that, the programme started in 2009 with 9 students (2 females and 7 males) who are expected to complete in 2012. The 9 students come from Uganda, Kenya, Tanzania and Malawi. Those from Malawi whom he has interacted with are progressing well in their research so far. Currently, the major challenge is research funds and stipend. The delay in research funds is affecting the progress of some research activities. Two students were given partial research funding by the International Food Policy Research institute (IPFRI). The department has recruited some students for the second intake who are self-sponsored.

3.4 Mrs Sylvia Chindime Mkandawire, Representative, RUFORUM

Mrs Mkandawire conveyed greetings from Professor Adipala, the Executive Director of RUFORUM, who failed to attend the ceremony because of other commitments at the secretariat. She thanked the principal and staff of Bunda College for continued commitment and support during similar activities. Mrs Mkandawire stressed that in the current business plan of RUFORUM, the main core area was skill enhancement and scientific data management. Hence, the workshop was organized to strengthen knowledge and skills of PhD students in

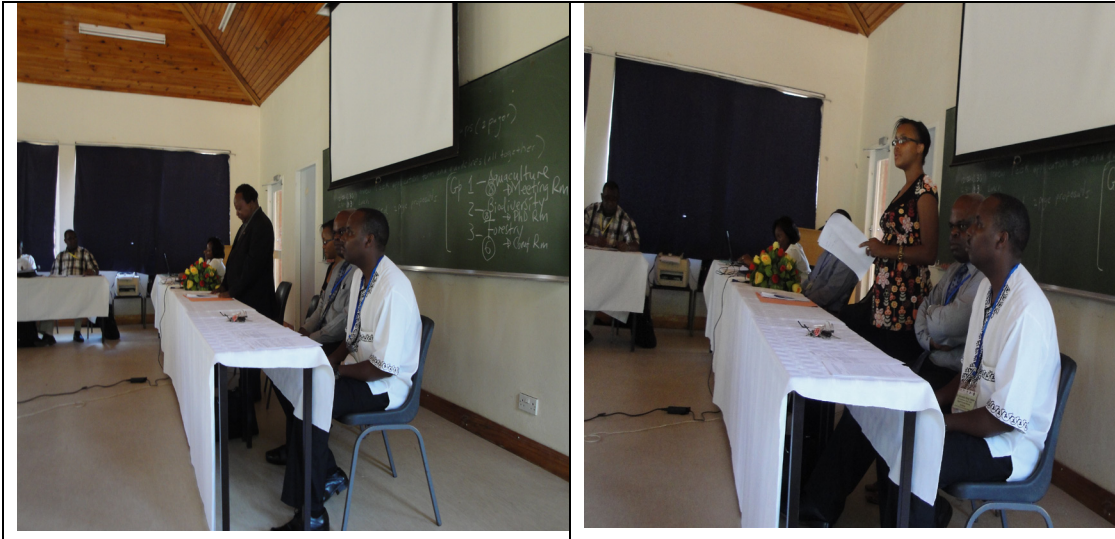
data management and analysis for different agricultural fields. This will enable the participants to analyse data and interpret their results, hence completing PhD studies on time. The initial plan was to train 41 students, but only 39 students were in the opening day with the rest expected later in the week. She thanked the principal and facilitators for their availability despite their busy schedules.

3.5 Official Opening Speech by Professor Kwapata

Professor Kwapata as the guest of honour expressed his gratitude for the trust and confidence that RUFORUM has demonstrated for Bunda University College of Agriculture to host its activities. The RUFORUM and Bunda have a shared vision of building capacity for Africa using locally available resources. However, challenges in resources are affecting the institution and students' progress. Students are not discontinued due to non-payment of the tuition fees, because Bunda University College understands the importance of capacity building and share this vision with the RUFORUM. However, the non-remittance of research resources timeously contributes to failure of some students to finish their studies on time. The students were advised to make use of the little resources available and also capitalize on skills learned in the training in order to complete on time. Students were reminded that one cannot publish if data is not well managed, handled, analysed and presented in a scientific manner.

Professor Kwapata mentioned that except for South Africa, Africa is not doing well in publication because of inadequate skills in scientific data management. Participants were urged to use the knowledge and skills learned from the training to manage and analyse data and subsequently publish the findings. In this regard, the facilitators were challenged to transform the participants in applying the knowledge and skills in different fields. In addition, participants were advised to be interactive and to share experiences in order to enrich their knowledge. The participants were challenged to be creative and innovative to counterfeit the challenges facing Africa. There is potential for innovation which can be achieved through proper data management and analysis. The participants were urged to take the training seriously.

Towards the end of his speech, Professor Kwapata introduced Professor Saka as the overseer of RUFORUM activities in Malawi. Therefore, all RUFORUM related activities in Malawi should be communicated through his office. In his conclusion, Professor Kwapata wished the participants a nice stay in Malawi and to tolerate the problems Malawi was facing, such as fuel shortages and electric power failure.



Professor Kwapata, Facilitators during the opening session and Mrs Sylvia Chindime Mkandawire, Representative, RUFORUM

4.0 CONDUCTING THE COURSE

4.1 Participants' Expectations and Fears

The participants were requested to indicate their expectations and fears before the training individually. The indicated expectations and fears were synthesized through group discussion and a summary is presented in **Appendix II**. Most cited expectations were: hands-on learning experience on data analysis with Genstat, survey, experimental and socio-economic data analysis, handling participants' specific problems, among others. Fear of having inadequate time for in-depth coverage and the varying levels of statistical experience among participants was mostly mentioned. The gathered information on expectation and fear was considered in the re-structuring of the training programme. This enhanced participation and eventual learning. A revised course programme which considered participants' expectations and fears was made (**see Appendix III**).

4.2 Modalities

The training focusing on scientific data management was conducted at Bunda University College of Agriculture, Lilongwe, from 14th to 18th November, 2011. The participants drawn from Soil and Water Management, Aquaculture and Fisheries Science, and Agricultural Resource Economics, were equipped with the

hands-on skills needed to improve the quality and quantity of their research publications. Prior to arrival, the participants were requested to bring their research proposals (Sokoine group), and field data collected (Bunda group). Opportunity was provided for facilitators to interact with individual students. The trainers accounted for the special needs of the different groups of students, by using various data sets from fields such as experimental and survey data. Those who brought their own data had an opportunity to analyse, interpret the results and prepare a draft publication while those with incomplete draft took the opportunity to polish their draft publications.

Each participant brought along a laptop. Real life data brought by the participants were occasionally shared during the practicals. The daily programme (**see Appendix III**) was divided into sections that allowed for an overview of the topics followed by computer practicals and discussions on the statistical results. Basic principles followed by computer examples were introduced first. Participants analysed their own data using techniques introduced daily. Discussions on interpretation and presentation of the results were held daily. Participants were free to use any statistical software which they had, such as STATA, SPSS, SAS, and GenStat. The GenStat which was made available to all participants was used throughout in analysis. In addition, SPSS which was also made available to all was used during the presentation of qualitative data analysis and time series sections.

The participants evaluated the modules on a daily basis and shortcomings were addressed immediately. An overall course evaluation was done at the end of the training using survey monkey tool.

4.3 Duration and Strategies

The course was designed to cover 4 days of intensive introduction/review of appropriate statistical concepts, and practical applications with real participants' research data, using statistical software GENSTAT and SPSS. A day of presentation by participants (making a total of FIVE days). The day's activity began at 8.30am and ended after 6.00pm. Discussions on interpretation and presentation of the results were held on each day during the plenary sections.

5.0 COURSE CONTENT

Electronic version of the course notes, exercises, examples and data sets were made available to the participants either prior to attending the training or during the training. However, examples used included some from the students. The slides used in the presentation were also sent to the participants at the end of the training.

The course content included data collection, managing data, analysing the data and writing the report. Aspects covered included: the different types of data and variables and implications for techniques for data measurement and collection; spreadsheet design for data capture, checking, storage, retrieval and other manipulations; identification and correction for outliers and missing/rogue data; simple exploratory data analysis and graphical presentations; confirmatory data analysis techniques for qualitative and quantitative data; and guidelines for scientific writing and presentation.

An introduction was made on GenStat use. The following topics were also covered with emphasis on software use on these topics made consistently. The topics were: aspects of survey and sampling procedures, overview of experimental design concepts, hypothesis testing and analysis of variance; Optimal & incomplete designs; correlation and regression; Generalised linear models (logistic model, log linear & survival analysis); Longitudinal and repeated measures analysis; multivariate analysis (PCA,FA,CCA, cluster & discriminant); presentation of results and daily computer practicals using participants' data. The presentations, discussions and computer practicals were shared out among the facilitators, in terms of leadership on a given topic.

It was encouraging to see many participants engage the facilitators in discussing their research work and relating the learned principles directly to their work. There was harmony during practices with participants interacting freely among themselves during computer practices and sharing ideas. This enabled many to benefit. Clarifications on simple but important statistical concepts were made in such discussions. In the final day, many participants were called upon to discuss their research work and to indicate how the acquired knowledge could be integrated into their research work.

6.0 DAILY TRAINING ACTIVITIES

6.1 DAY 1 (November 14, 2011)

Establishing Ground Rules

As a normal approach to such training, participants are requested to select a time keeper, energizer and person to collect daily evaluation forms. We had Sister Jane the time keeper, Mr Wales Singini the energizer and Mr Albert Mnsonga in charge of daily evaluation forms. Participants were taken through a presentation on the training overview that included objectives, aim, expected outputs and participants' expectations.

Overview of experimental designs; design aspects, approach to analysis, hypothesis testing

The session that followed upto lunch break involved presentation of the components in the research process which included: identify the question of interest, review relevant theories and research, develop hypothesis- null and alternative, identify independent and dependent variables, design a study and conduct the experiment, collect the information, data entry and management, use descriptive statistics to describe the data, use inferential statistics to evaluate hypothesis, draw conclusions regarding the research hypothesis, objectives and research question and prepare a formal report.

Participants who were at the stage of data collection needed the topics covered in this session the most. . The topics were: steps to design a good experiment and the principles of experimental design, different types of design as applied in agricultural sciences, formulation of hypothesis and ways of analysis data from the mentioned design. Relevant examples were cited followed by exercises aimed at assessing the participants' knowledge of design of research and analysis of data. The exercise required trainees to write their topic, research questions, research hypothesis, method of data collection and types of descriptive and inferential statistics that was necessary to answer the students' objectives (**see Appendix IV**). The participants were required to hand in their one page write-up the next day.

Data Management using Spreadsheet & Introduction to GenStat

Data management strategies were discussed such as: looking after field data sheets, entering data into computer checking, data and preparing for analysis, maintaining records of the processing steps and archiving the data for future

use. The trainees were introduced to use of Genstat, initially some participants were not interested in learning Genstat, because they were not using it in analysis of their data. However, facilitator assured them that the most important principle was to know what type of statistical method that was suitable for their data and then analysis can be done in any statistical software. By the end of this session all participants appreciated the introduction to use of Genstat. This session involved how to set up a spread sheet, naming of variable and checking for any errors.

Overview of Formal and Informal Survey designs

The topic covered the different aspect of formal and informal survey as applied to agricultural sciences. The steps taken in designing a formal and informal survey were highlighted, with examples. Participants were introduced to the different types of formal and informal survey. The day ended with evaluation for Day 1 presentations by the participants. A format of daily evaluation is given in Appendix V.

6.2 DAY 2 (November 15, 2011)

Analysis of qualitative data

This day started with analysis of data from qualitative data. The training was on how to code qualitative responses especially from a focus group discussion. Coding was defined as a process of combing the data basing on common themes, ideas and categories, topics, concepts, terms, phrases and keywords. Participants were showed how to code and analyse qualitative data. An exercise to analyse the qualitative responses about the expectations of SDM from the participants was given (**see Appendix VI**). In this exercise, participants were divided into four groups and asked to code and analysis the expectations. Presentations were made by representative of each group in a plenary session.

Exploration of survey and qualitative data

Qualitative data analysis was followed by exploratory data analysis (EDA) and this topic was aimed at enabling participants to understand and correctly apply EDA. The participants were informed that EDA feeds into the planning of the final analysis. When conducting EDA, variables for summarising the findings, which factors are required in the model and determining the most appropriate tables and graphs to address the objective, are identified. Different types of EDA and managing of the outliers were taught. Practicals on all the EDA on survey data

set were undertaken. More emphasis on data management and analysis in SPSS was made. Construction and use of Lorenz curve by agricultural economists to assess the income and distribution of assets was made. This excited students in the agriculture economics group.

Data manipulation and exploration – Quick diagnostic

EDA for qualitative data were followed by quick diagnostics. The objectives of the topic were to identify or detect and manage outliers. At the end of the topic, participants practiced all the gained knowledge on their data. It was a necessity to conduct exploratory data analysis, to help in identifying the problems in data, before conducting inferential statistics. Unfortunately, students skip quick diagnostics and go straight to inferential statistics. Data manipulation and exploration using both SPSS and GenStat was also conducted.

Performing analysis of variance with examples – Using general analysis, REML approach

The topic was introduced with the aim of showing participants ways of analyzing data collected from an experimental study. Participants were showed how to analyse data using general linear model and restricted maximum likelihood (a method that handle data consisting of both fixed and random effects). The principles were illustrated using practical examples.

6.3 DAY 3 (November 16, 2011)

Relationships & Association; Correlation, Simple & multiple linear regression, Model building and regression with grouped

This topic was introduced with the aim of enabling students to understand when to apply regression analyses. The topics covered were concepts of correlation, simple linear and multiple linear regression, model building and dealing with data whose exploratory various are categorical. Data sets that cut across most of the participants' disciplines were used. The participants were divided into four groups (water, soil, aquaculture and agricultural economics) within which they practiced the taught concepts using the availed data sets.

Generalised linear models (GLM): Logistic model and Loglinear

The main aim of this topic was to show participants that when data does not conform to the assumptions under regression and ANOVA, GLM can be used,

because it allows for one to specify the distribution. Data sets from survey and medical field were used to showcase how GLM could be used to analyse such data. Participants again regrouped into four and practice the above analyses. To assess whether the participants could correctly state the statistical method to analysis data for their research, an exercise was given to each group. The groups choose a chair and a person to present the group finding. One research topic from the group was randomly selected for discussion following the guidelines given in the exercise.

6.4 DAY 4 (November, 17 2011)

Longitudinal analysis: repeated measurement & over time and space

The methods discussed in this session were aimed at showing the participants, statistical techniques for analyzing data collected over space, time and depth. The participants got to learn that data that does not conform to the assumptions under ANOVA could be analysed using mixed model, and specifying the suitable covariance structure. Data from the soil and water field was used. The trainees practiced how to analyse the data using GenStat.

Longitudinal analysis: - Time series-ARIMA model

Introduction of this topic made almost all trainees from the agricultural economics completely appreciate the training. Issues of stationary and non-stationary models were discussed noting that regression analysis assumes stationary while economic time series are non-stationary. Hence the need to model the time series trend in data. The challenges of time series data included dealing with missing values, non-stationary, and autocorrelation and spurious. Graphical and statistical tests for autocorrelation were explored with practical handled in SPSS using survey data set provided.

Multivariate analysis: PCA, FA & CCA Cluster, Discriminant

The principle component analysis (PCA), factor analysis (FA) and canonical correlation analysis (CCA) as variable directed variable techniques, and cluster analysis and discriminant analysis as individual directed techniques were discussed in this session. Statistical methods that handle multiple responses and explanatory variables that are highly correlated and can not be handled by multiple regression were introduce in this session. Explanations were made on the use of PCA and how they relate to FA. Other multivariate methods were described both theoretical and practically using various data sets.

Group presentations

During this session, each group presented their findings and it was discovered that the participants had greatly improved in identifying the correct statistical methods for the corresponding objective and type of data. The participants also admitted that the group discussion helped them internalize what they had covered in the previous days. The probing research questions enabled participants to reflect on their specific research work. Most of the participants extended similar exercise to their specific work.

6. 5 DAY 5 (November, 18 2011)

Individual student research presentations-3 groups (AQFS, ARE, S&W)

Individual work was present within each of the three main programmes. In each group a resource person and programme coordinator were present. The participants were divided into three groups namely; Soil and Water Management (S&W), Aquaculture and Fisheries Science (AQFS) and Agricultural Resource Economics (ARE). Each group was allocated a facilitator, RUFORUM and Bunda college staff. The students presented their research progress and this was followed by discussion of the student's research with emphasis on design of experiment & survey, data collection and management, analysis and interpretation. The day was closed by a presentation summary finding listed below.

Summary of students' presentation of key SDM issues for RUFORUM training programmes and R&D in the region

S& W Facilitator summary findings

1. Title should be concise and short
2. The objectives should be derived from you title and problem statement
3. Methodology should answer the stated objectives- refined methodology, and objectives

AOFS Facilitator summary findings

1. Most students had collected data on objective one
2. Most students had not started analyzing data collected
3. Most of the students will be able to complete on time due to the schedule of their experiments which will run for 12 months

4. Most students indicated that they do not get timely feeder back from their supervisors but also noted that they can not query their supervisors since they are not paid
5. The participants had improved in associating the data type and statistical methods to be used

ARE Facilitator summary findings

1. Most of them have collected data mainly secondary data, one student
2. Feed back from their students delaying their progress
3. Generally students have improved the way they relate their statistical techniques to their objectives
4. Life long and live (remember three Ls)
5. The participants were reminded that they will be authorities in their area of research and so they have to do a good job
6. The research should generate knowledge that can be published
7. The training will add value to their research and time management is very critical

Cross Cutting Limitations for Student Research Progress

- Timely payments of Tuition & Supervisory fees
- Timely payment of stipend
- The students released that the equipment and field data collection exceed the amount provided by RUFORUM
- Day to day running of the program not facilitated

7.0 EVALUATIONS

Participants were also given the opportunity to provide evaluation of the course on daily basis (**see Appendix VII**). Issues raised on daily basis were addressed as appropriately as possible. This provided direct assessment of course modules by resource persons and general comments on course (**see Appendix VIII**) should serve useful guide on future course development and delivery as well as choice of locations.

7.1 Inferences on Evaluation

From these evaluations, the following summary may be deducted:

- Course duration was short, and affected more practical or hands-on work with the computer software
- Need for pre-research course on design development and general research outlook was emphasized

7.2 Online overall evaluation

Participants reported that the training was good and timely because most of them were either collecting data or planning to start data collection. They expressed that most of the topics presented during the training were useful and relevant to their research orientation. However, participants complained that time allocated for the training was not adequate as such some presentations were rushed through. It was also observed that time allocated to exercises/practicals was not enough to enable participants practice their skills in data management and analysis using different statistical softwares.

Some participants, especially with social science background, expressed that the training was more aligned towards agricultural sciences. There were few presentations and practicals that directly addressed issues related to social sciences. They advised that future training in SDM should split participants according to their research interests and relevant research issues and statistical softwares should be introduced. Social scientists recommended the use of STATA in future trainings.

Information on SDM from the Lesson sharing event

Scientific Data management and analysis training is a useful and educative course for postgraduate students. Participants observed that there was too much work that was covered within 4 days as a result they did not have enough time for practice. They suggested that future trainings should provide more time for both theory and practice. In addition participants noted that the training provided some insights that are required during proposal development, for example, experimental and survey design and recommended that future trainings be conducted before proposal development and after data collection. The training also provided an opportunity for the students to meet with their supervisors to discuss the progress of research. Students felt that there is also need to retool the supervisors especially in statistical softwares and analysis that are emerging.

From the participants observations, the way forward for future SDM training are:

1. Increase the length of time for the training
2. Split the training into two, before proposal development and after data collection

3. Provide similar trainings to the supervisors so that they may be discussing at the same level with the students.
4. Use a variety of statistical softwares to meet individual data analysis needs
5. Use examples/data from different research fields to accommodate all the students in the training

8.0 CLOSING AND SUGGESTIONS

8.1 Closing Ceremony

This session was attended by RUFORUM STAFF; Dr. Ekaaya W, Dr. Washington Ochora & Ms. Sylvia Chidime, the facilitators and staff of Bunda college. Dr Njuho gave the closing remarks that included a highlight of the importance of the training and implications for the future training programs. He indicated that the training workshop was a learning process for both facilitators and participants. He also urged the PhD students to utilize the gain statistical skills to complete their thesis on time. Dr Njuho informed participants that their group will be used as a baseline to assess the impact of the training and therefore, the RUFORUM website will be visited to check for the number of publications that come in every year. He expressed his gratitude to Bunda College of Agriculture for hosting the workshop and also thanked Ms. Sylvia Chidime for coordinating the process smoothly. Appreciation was extended to timekeeper, energizer and the person in charge of collecting the evaluation forms. Ms. Sylvia Chidime thanked the facilitators for the training.

8.2 Conclusions

Almost all the participants indicated the allocated time for the course to be short. A minimum of two weeks could be an ideal time to enable coverage of many topics and enough practical time. A need for exposure to design principles at design stages of research, and after data collection stage exists.

On the course itself, a review of expectations before and after the course suggests that the course objectives and participants' interests were well served. It is our expectation that participants take advantage of the network of facilitators and participants for their future development. The facilitators express their sincere appreciation for the invitation to serve as resource persons, and look forward to further positive interaction. The special efforts of RUFORUM Executive Secretary Prof E Adipala, staff of Bunda University College of Agriculture and

training/programme coordinator Mrs. Sylvia Chindime are specially acknowledged.

APPENDICES

Appendix I: List of Course Participants

1. PHD IN AQUACULTURE AND FISHERIES SCIENCES, BUNDA COLLEGE- UNIVERSITY OF MALAWI

No	NAME	GENDER	NATIONALITY	CONTACT INFORMATION	RESEARCH TOPIC
1	Kamugisa Godfrey Mwesigwa	M	Ugandan	Department of Wildlife and Animal Resources Mgt, faculty of Veterinary Medicine, Makerere University, P.O Box 7062, kampala, uganda. Tel:+256 70 2 96393 or +256 77 2 412453 Email:kamugisa@vetmed.mak.ac.ug or kamugisa@gmail.com	<i>Reproductive Biology and Ecological Niche Studies of Alestes baremose fish species in the River Delta Regions of Lake Albert in Uganda</i>
2	Kapute Fanuel	M	Malawian	Aquaculture fisheries department, Bunda college, P.O Box 219, Lilongwe, Malawi, Tel: +265 999 916 110 Email:fanuelkapute@yahoo.co.uk or fkapute@bunda.unima.mw	<i>Quality and Risk Assessment of Safety Hazards in Fresh Fish and Fish Products in Malawi</i>
3	Wales Singini	M	Malawian	CCAP, Development Department, P.O Box 27, Ekwendeni, North of Malawi. Tel: +265 888 340793 Email:walesingini@yahoo.co.uk	<i>Economic benefits associated with the restoration of valuable fish population in lake malombe. – an ecological economic approach to fisheries management</i>
4	Msonga Albert	M	Zambian	Department of Fisheries, Chilanga Fish Farm, Box (260) 350100 Chilanga, Lusaka, Zambia. Tel: +260 978100020 Email:albertnsonga2000@yahoo.com	<i>Epidemiology Of Epizootic Ulcerative Syndrome (Eus), A Fungal Infection On Fish Of The Zambezi River Basin. A Case Study For Zambia</i>

5	Alexander Kefi	M	Zambian	National Aquaculture Research and Development Center, P.O Box 22797, Kitwe, Zambia. Tel:+260 212 239 108 or +260 979 255 620 Email:askefi@yahoo.com	<i>The Effect of Varying Dietary Lipid Levels and Androgen (11 – Ketotestosterone) On Egg Quality And Their Influence On The Growth Of The Progeny Of Oreochromis Andersonii</i>
6	Lewaantai Caleb Solitei	M	Kenya	Egerton University, Department of Animal Sciences, P.O Box 536, Njoro, Kenya. Tel:+254 722944418 Email:lewucal@yahoo.com	<i>Characterization of Wild and Cultured Oreochromis Shiranus, and Their Culture Trials in Malawi</i>
7	Joshua Valeta	M	Malawian	Bunda College, P.O Box 219, Lilongwe. Tel:+265 999101788 or +265 888724409. Email:valetajoshua@yahoo.com or jvaleta@bunda.unima.mw	<i>Design and Evaluation of a Cascade Algal Turf Scrubber Based Re-circulating Aquaculture System for Oreochromis Karongae (Chambo) and Lactuca sativa (Lettuce) Production</i>
8	Leston Yoyola Phiri	M	Malawian	Malawi College of Fisheries, P/Bag 7, Mangochi, Malawi. Tel: +265 999687649 Email:yoyola_phiri@yahoo.co.uk	<i>Value Chain Analysis of the Fisheries Industry in the Southern Malawi: The Case of Lake Chilwa</i>
9	Sr Yatuha Jane	F	Ugandan	Mbarara University of Science and Technology, Faculty of Science, P.O Box 1410, Mbarara Uganda	<i>Food and Feeding Ecology of Clarias Carsonii, A Potential Culture Species for Small Holder Fish Farms</i>
10	Alexander Bulirani	M	Malawian	Department of Fisheries, P.O Box 593, Lilongwe, Malawi. Tel: +265 999 82 5282; +265 888325282. Email:bulirani@sdpn.org.mw or bulirani@gmail.com	<i>Population Dynamics and Taxonomy of Diplotaxodon Big-Eye (Teleostei Cichlid) In Central and Southern Lake Malawi, Africa</i>

2. PHD AGRICULTURE RESOURCE ECONOMICS INTAKE 2010 - BUNDA COLLEGE OF AGRICULTURE, MALAWI (highlighted in yellow are the IDRC supported students)

No	NAME	GENDER	COUNTRY	CONTACTS	RESEARCH TOPIC
11	Horace Happy Phiri	M	Malawian	P.O. Box X213, Post Dot Net, Crossroads, Lilongwe, Malawi. Tel: +265 888895910. Email: horacephiri@yahoo.com horacephiri@gmail.com	<i>The Analysis of Agricultural Policies in Malawi: the Maize Political Economy</i>
12	Francis Tapasila Gondwe	M	Malawian	World Forestry Centre, Chitedze Research Station. P.O. Box 30798, Lilongwe 3, Malawi. Tel: +265888875374. Email: FMGondwe@cgiar.org / fmgondwe@africa-online.net	<i>Economic Impact of Integrating trees on Smallholder Agriculture</i>
13	Bonface Kakhobwe	M	Malawian	Save the children International, Lilongwe, Malawi Email: bkakhobwe@savechildren.org	<i>Analysis of Complementary Options for Fertilizer Subsidies in Malawi: A Case of Lilongwe, Mzuzu and Machinga Agricultural Development Divisions</i>
14	Hellen Kongai	F	Ugandan	P.O. Box 7062, Kampala, Uganda. Tel: +256712850238. Email: hkongai@agric.mak.ac.ug or hellenbiruma@yahoo.com	<i>Effect of Market access on agricultural productivity and Efficiency : The Case of Citrus Fruit Producers in eastern Uganda</i>
15	Irene Musembe	F	Kenyan	P.O. Box 24682-00100, Nairobi, Kenya. Tel: +254712358653. Email: nambuya2005@yahoo.com / musebu_ro@yahoo.com	<i>Assessing the Economic Impact of HIV/AIDS Epidemic on Agricultural Development in Kenya</i>
16	Mildred Barungi	F	Ugandan	IITA, Kawanda Agricultural Research Institute. P.O. Box 6247, Kampala. Tel; +256772340234. Email: mildredbarungi@yahoo.com	<i>Effects of Land Management related Policies, Laws and Bylaws on adoption and Scaling up of Sustainable land Management Innovations in Uganda</i>
17	Vincent Ekiyar	M	Ugandan	Amuria district Local Govt. P.O. Box 4, Amuria. Uganda. Tel: +256772677077. Email: vekiyar@gmail.com/	<i>Climate Change Impacts to Farming I Uganda's Semi Arid and Arid Areas, Farmer's means of Adaptation: An application of Cross- Section Data Measures</i>

				ekiyarit@yahoo.com	
18	Mbise Mirau	M	Tanzania	Mkwawa University College of Education. PB Mkwawa, Iringa-Tanzania. Tel: +255755184071. Email: mbise2002@yahoo.com	Transaction Costs in Food Market Chains and Food Security: A case of Maize in Ludewa and Songea district of Tanzania

3. PhD DRYLAND RESOURCE MANAGEMENT (highlighted in Yellow are the IDRC supported students)

No	NAME	GENDER	COUNTRY	CONTACTS	RESEARCH TOPIC
20	Obudho Elias Otieno	M	Kenya	Dept of Plant science & crop protection, Fac of Agric, UoN. P.O. Box 29053, 00625, Nairobi Kenya. Tel: +254722251124. Email: eliasobudho@yahoo.co.uk/ eobudho@uonbi.ac.ke ; Tel: + 254 722 251124	Modeling climate related index-based risk Transfer products to enhance pastoralists resilience in the drylands
21	Debela Hunde Feysa	F	Ethiopia	Jima University, college of Agriculture & Vet Medicine. P.O. Box 307. Tel: +251471111087/+251 911 056 751 Jima, Ethiopia. Email: feyssahunde@yahoo.com or feyssahunde@gmail.com	A comparative of use of management of wild Edible plants on food security among transhumanant and settled farmers in semi arid east shewa, Ethiopia
22	Zziwa Emmanuel	M	Uganda	Makerere university, Faculty of Agric. Dept of Animal Science. P.O. Box 7062, Kampala. Tel: +256774835991. Email: zziwaemma@agric.mak.ac.ug	Land Use changes in the rangelands of Uganda: Impacts on soil quality and pasture productivity in Nakasongola District

23	Mugerwa Swidiq	M	Uganda	Makerere university, Faculty of Agric. Dept of Animal Science. P.O. Box 7062, Kampala. Tel: +256782660295. Email: swidiqk@yahoo.com	Termite Dynamics and Control on Pasture grasses in semi Arid Nakasongola
24	Moyo Melusi	M	Zimbabwe	Lupane State university, P.O. Box AC 255 Ascot, Bulawayo, Zimbabwe. Tel: +2639883830/ +263912249259. Email: memoyo@lsu.ac.zw/ melusim5@gmail.com	Tillage effect on soil moisture, crop growth and soil organic carbon in a cereal- legume strip intercropping in semi arid conditions
25	Chibinga Oswin Chifungwe	M	Zambia	University of Zambia, School of Agricultural Sciences, Dept of animal Sciences. P.O. Box 32379, Lusaka, Zambia. Tel: +260955 762708 or +260 978 521112. Email: ochibinga@yahoo.co.uk	Climate variability : Enhancing adaptive utilization of forage for improved livestock production, and food security among the agro pastolists in Southern Zambia
26	Nalule Sarah Agnes	F	Uganda	Makerere university, Faculty of Vet Medicine, Dept of Wildlife and Animal Resources management. P.O. Box 7062, Kampala, Uganda. Tel: +256772588010. Email: snalule@vetmed.amak.ac.ug or snalule@gmail.com	Enthnopharmacology, phytochemical composition and toxicity of medicinal plants used against livestock helminthes in dry lands
27	Kudra Abdul	M	Tanzania	Department of crop science and production, SUA. P.O. Box 3005, Morogoro-Tanzania. Tel: +255754632778. Email: abkudra@yahoo.com	Influence of soil fertility management on string seed bank dynamics and grain yield of sorghum in semi arid areas

4. PHD SOIL AND WATER MANAGEMENT - SOKOINE UNIVERSITY OF AGRICULTURE IN TANZANIA SUPPORTED BY RUFORUM (highlighted in Yellow are the IDRC supported)

No	NAME	GENDER	COUNTRY	CONTACTS	RESEARCH TOPIC
28	Karuma, Anne Nyambura	F	Kenyan	P.O. Box 846-00208, Ngong Hills, Kenya, +254 725 741986; annekaruma@gmail.com; anne_karumah@yahoo.com	<i>Evaluation of Selected Combined In Situ Rainwater Conservation Tillage Practice on Maize Production in Mwala District, Kenya</i>
29	Kutua Kidagho Mohamed	M	Tanzanian	P.O. Box 200, Handeni, Tanzania. Email: kutua@yahoo.com	<i>Ecological service provisioning by different land uses practice in Handeni District, Tanga, Tanzania.</i>
30	Msongaleli, Barnabas Msolini	M	Tanzanian	C/O Mrs Bernadeta Msongaleli, P.O Box 595, Dodoma; +255 754821636/ +255 764201080 Email: bmsongaleli@yahoo.co.uk	<i>Modeling the Potential Impacts of Climate Change Variability and Change on Rainfed Agriculture in Tanzania</i>
31	Mwenechanya, Frank	M	Malawian	FISD, P.O. Box 31245, Lilongwe, Malawi; +265 8361 757/ +265 9361757; mwenechanyafrank@yahoo.com	<i>Development of a Decision Support Tool for Designing of Controlled Drainage and Sub Irrigation in Dambos of Central Malawi.</i>
32	Singa, Darwin Dodoma	M	Malawian	University of Malawi Bunda Collage Of Agriculture, P.O Box 219, Lilongwe, Malawi; +265 999808900 or +265 888347614; dodomamwasinga@live.com; dodoma1mwasinga@yahoo.com	<i>Modelling of Runoff Water Storage for Bean Irrigation Using PARCHED-THIRST Model in Drought Prone Ukwe Area, Malawi</i>

5. AGRA LEVERAGED SUPPORT IN SOIL AND WATER MANAGEMENT – SOKOINE UNIVERSITY OF AGRICULTURE, TANZANIA

N O	NAME	Sex	NATIONALITY	CONTACTS	RESEARCH TOPIC
33	John Mthandi	M	Malawian	Mulanje Mountain Conservation Trust Email: johnmthandi@yahoo.com	Nitrogen Movement Under Different Soil Types and Water Application Regimes in Maize Production: A Case of Nkango Irrigation Scheme in Kasungu District, Malawi.
34	Kebeney, Syphyline Jebitok	F	Kenyan	Moi University; Tel: +254 727567485; syphy@yahoo.com Email:	Sorghum-Soybean Intercropping and Its Influence on Soil Nitrogen, Soil Moisture and Sorghum Yields In Some Soils of Busia District, Kenya
35	Lemma Wogi	M	Ethiopian	Haramaya University, P. O. Box 138, DIRE DAWA, Ethiopia Email: l.wogi@yahoo.com	Organic Carbon and Nutrient Dynamics Under Farmer Crop Residue Management in Haramaya and Kersa Districts, Eastern Ethiopia
36	Mourice, Sixbert Kajumula	M	Tanzanian	Department of Crop Science and Production SUA, P.O. Box 3005, Morogoro Tanzania Tel:+255 713598837 Email: sixbert.mourice@suanet.ac.tz	Maize Potential Yield For Rain Fed Crop Systems In The Wami-Ruvu River Basin, Tanzania.
37	OMOLLO, Jacob Omondi	M	Kenyan JKIA	Kenya Sugar Research Foundation, Email:+254 722972758; jacob.omollo@kesref.org, jac.omollo@gmail.com	Evaluation of Lime Placement in Ameliorating Soil Acidity for Improved Nutrient Uptake and Yields of Sugarcane-Soybean Intercrop in Western Kenya
38	Phiri, Austin Tethani	M	Malawian	Ministry of Agriculture and Food Security; Email: Phiriaustin923@gmail.com	Pigeon pea-Groundnut Intercrop Maize Rotation Cropping System: A Tool for Improving Nitrogen Use Efficiency for Improve Maize yield in Malawi.
39	SAKO, Assefa Menna	M	Ethiopian	Ethiopian Institute of Agricultural Research (EIAR); +251 585500277, assefams@yahoo.com	Sulfur Nutrition of Wheat in East Showa, North Showa and Arsi Zones of Ethiopia
40	SIRIKARE, Sylvere N.	M	Rwandese JNIA	Rwanda Agricultural Research Institute (ISAR); Email: sirikasy@yahoo.fr	Optimization of Liming Materials Use on Maize, Bean and Potato Crops In Acidic Soil Of Southern Rwanda

41	Tiluhongelwa, Thomas D. B.	M	Tanzanian JNIA	Tanzania Cotton Board; Telephone: +255 769976111/ +255 787676111; Email: tiluhongelwa@yahoo.com	The Use of Gypsum Rocks in Improving Maize Performance in Acid Soils of Mbinga District, Tanzania
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Appendix II. Summary of participant's course expectations

Design	Data management using spread sheets	Data analysis & interpretation	Research collaboration	Others
Designing a scientific experiment	To master data management, manipulation and exploration-quick diagnostics	Regression and time series	Receive more friends for research	Model with my data
Designing survey study	Data entry and management	Multivariate analysis: cluster analysis, PCA, FA, CCA, Discriminant analysis	Networking	Guidance on general requirements in quality journal papers
	Computer practical on excel and GENSTAT	Survey data analysis		Requirements of peer-reviewed journals
	How to handle missing plot & data	Qualitative data analysis		
	Data storage	Multiple Response		
		Choose correct method of analysis for my data		
		Post Hoc analysis		
		Analysis of Genetic data		

Appendix III. A revised programme based on students' expectations

Scientific Data Management Course for PhD students under RUFORUM

November 14th -18th 2011, Malawi.

<i>Time</i>	<i>Monday 14 November</i>	<i>Tuesday 15 November</i>	<i>Wednesday 16 November</i>	<i>Thursday 17 November</i>	<i>Friday 18 November</i>
0830-	Registration Opening Ceremony Objectives & overview of course All	Qualitative data analysis- TK	Relationships & Association • . Simple & multiple linear regression SB/PN	Longitudinal analysis • Repeated measurement • Over time and space SB/PN	Individual student research presentations-3 groups (AQFS,ARE,S&W): Resources persons split into 3 groups and joined by academic staff
1015-	Health Break	Health Break	Health Break	Health Break	Health Break
1030-	Overview of experimental designs • Design aspect • Approach to analysis • Hypotheses testing. SB/PN	Exploration of survey and qualitative data. G/TK	Computer practical & discussion of results All	Longitudinal analysis • Time series ARIMA model Computer practical & <i>discussion of results</i> TK/ SB/PN	Student progress presentations and reviews continued
1230-	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
1330-	Data Management using Spreadsheet & Introduction to GenStat PN/SB	Data manipulation and exploration – Quick diagnostic SB/PN	Generalised linear models • Logistic model • Loglinear, etc PN/SB	<i>Multivariate analysis</i> • PCA, FA & CCA • <i>Cluster, Discriminant, etc</i> PN/SB	Student progress presentations and reviews continued
1515-	Health Break	Health Break	Health Break	Health Break	Health Break
1530-	Overview of Formal and Informal Survey designs TK/G	Performing analysis of variance with examples – • Using general analysis REML approach SB/PN	Computer practical & <i>discussion of results</i> All	Computer practical & <i>discussion of results</i> All	Plenary: Summary presentation of key SDM issues for RUFORUM training programmes and R&D in the region

PN- Peter Njuho; SB – Susan Balaba Tumwebaze; G-Dr. Gondwe; TK-Dr.Tasokwa K

Appendix IV. Groups Dynamics Relating to Selected Topics among the Participants

Instructions

Select two topics within your group using a random process

1. The selected topics will be discussed among group members by the "owners".
2. The group will select a leader who will give direction not necessarily the owners of the selected topics. The group will also choose a presenter of the finding.
3. The group will need to be meeting every evening to discuss how the techniques learned in the day can or cannot apply to the two selected topics. A record on the identified things that apply or not apply and "whys", need to be kept by the group leader.

Discuss the selected topics and respond to the following:

- *What is the purpose of this experiment or survey?*
- *Objectives?*
- *What question(s) do you want answered by this experiment?*
- *To what population are these answers supposed to apply?*
- *How will you know when the question is answered? Or what evidence (data) will it take to answer your question?*
- *How will you represent the population (what is the experimental unit (s))?*

Identify or Characterize resources:

- Factor levels required
- Variability among experimental units
 - *How much?*
 - *Do blocking criteria exist?*
- Constraints
 - *Space, time, labour (amount and skill)*
 - *Technology*
- Outline the type of summary statistics will be needed to support study objectives. How will be presented?

Appendix VI. Qualitative data analysis exercise

Analyse and interpret these answers as follows:

- Develop a coding system by categorizing the answers. First read all answers carefully. Then make rough categories of answers that seem to belong together. Try to limit yourself to 5-7 groups. Label each group of answers with a key word that seems to characterize the answers.
- List all answers again, but now in 5-7 groups under the labels you have selected and identify the most frequent category.
- Discuss the groups, for example in terms of types of messages you would use to tailor the training to participants' expectations. This helps to identify whether the answers indeed belong together. You may split up some groups of answers and combine others. Find an appropriate 'label' for each category and count how many answers you have for each category.
- Come up with suggestions for interventions (themes) to address these expectations.

Training Expectations

1. What is entailed in data cleaning process? Is it in order to completely eliminate outliers?
2. What diagnostic tests should be performed on the variables before embarking on the actual data analysis?
3. How much details must one draw for the output tables for inclusion in the text?
4. Should explanations be provided even for statistically insignificant variables?
5. How (advise) can a working student plan her/his activities to ensure she/he completes in the stipulated time?
6. What should the student do when her/his academic supervisors take long to read their submissions?
7. Precautions in collecting scientific data, as to how to handle and store them.
8. Principles and practices of some basic experimental designs .
9. Some basic statistical methods or packages and their usage - How to analyze data and interpret them?
10. I expect also, conducive training environment
11. Data collection in a consistent and systematic manner.
12. Data analysis methods that allow choice of data, evaluation and interpretation into meaningful conclusion
13. Data reporting with regard to publication of preliminary and conclusive findings
14. Improvement of my PhD research proposal with regard to material and methods section on data collection and analysis
15. Advance methods of research design, data presentation and reporting
16. Use limited resources to achieve optimum research outcomes

17. manage unclear supervisory advice in proposal writing and research project
18. To know and master different packages of data analysis
19. To know on research statistical model development.
20. To understand the electronic research data protection.
21. To know tools for and methods of data extraction for analysis.
22. To understand the means to interpret and evaluate the comparability of data sets.
23. To acquire in depth knowledge of technical solutions in existence that address the data storage and access in research.
24. To acquire knowledge on research design, data presentation and reporting.
25. To know limitations and advantages of each methods of scientific data analysis.
26. Data handling, storage, and access
27. Data organization
28. Data quality
29. Data exploration
30. Scientific data formats
31. Data dissemination and publication
32. Top up facilitation on research designing (e.g. research on land conservation)
33. Top up facilitation on collecting and analyzing of quality data.
34. More friends and experience from other members.
35. Design of experiments
36. Experimental layout
37. Managing and analyzing data
38. The appropriate statistical software for agricultural research

Appendix VII. Supplementary Comments on Daily Evaluations

Day	Participants Comments (+ve)	Participants Comments (-ve)
Monday, 14 November 2011	Overall participants indicated that the knowledge acquired was very good and the topics of the day were very relevant and useful. There was appropriate depth of coverage for the day's topics and that the presentation, training Materials & time allotment was good; Good Content & presentation Facilitators working as team and interjecting where emphasis was required was 'viewed positively'	Needed to used other programs like STATA.
Tuesday 15 November 2011	The content and knowledge acquires was good but more time was needed for training. Trainers presented the content well and computer practical using different examples facilitated their understanding.	There was a need for more time
Wednesday 16 November 2011	The lecturers are excellent, they made us understand things that were questionable on data analysis; The sessions are were very good, educative, the material was appropriate and helpful Enough content presented	The course needed more time than was allocated; Schedule too tight, participants need a break between different courses
Thursday 17 November 2011	The timing was appropriate and trainers were good The course is very useful to our studies. Data in areas of soil & water plus agricultural economics were used in the training and this helped participants to correctly relate their statistical methods to the type of analysis.	
Friday 18 November 2011	This was a chance for participants to showcase the statistical knowledge learnt over the week	

Appendix VII Summary of Evaluations (% responses, n=27)

Assessment	Knowledge acquired		Relevance of Knowledge		Presentation			Depth of coverage		Training materials			Time allotment		
	Much	Some	Very	Partial	Good	Satisfactory	Poor	App	Sup	Good	Satisfactory	Poor	long	Good	short
Topic															
Overview of experimental designs	59	41	82	18	77	23	0	84	16	46	54		14	64	22
Data management using Genstat	50	50	83	17	67	29	4	77	23	50	42	8	13	52	28
Overview of Formal and Informal Survey designs	26	74	78	22	46	54	0	83	17	43	57	0	0	61	39
Qualitative data analysis	35	65	87	13	65	35	0	74	26	65	35		9	78	13
Exploration of survey and qualitative data	64	36	87	13	74	26	6	69	21	74	26	0	14	64	22
Data manipulation and exploration – Quick diagnostic	64	36	100	0	73	27	0	82	18	73	27	0	9	64	27
Performing analysis of variance with examples	44	56	89	11	53	37	10	68	13	47	37	16	5	47	48
Relationships & Association	65	35	87	13	71	29	0	87	13	54	42	4	71	29	0

Computer practical & discussion in Relationships	50	50	81	19	80	20	0	82	18	67	33	0	67	33	
Generalised linear models(GLM)	44	56	91	9	68	32	0	14	86	51	49	0	78	22	0
Computer practical & discussion in GLM	40	60	90	10	82	18	0	82	18	64	36	0	90	10	0
Longitudinal analysis(Repeated measurement)	59	41	85	15	74	26	0	85	15	62	38	0	74	26	0
Longitudinal analysis(Time series)	59	41	89	11	82	0	0	77	23	62	35	3	65	35	0
Multivariate analysis	42	58	79	21	60	40	0	79	21	65	30	5	64	36	0
Computer practical & discussion in Multivariate analysis	83	17	83	17	67	33		67	33	67	33	0	67	33	0

Appendix V: Evaluation forms

Daily Evaluation of Activities

We request you to please take a few minutes after each activity to assess the activity based on the criteria given below.

Date.....14/11/2011.....

Thank you.

Topic/Activity	Knowledge acquired			Relevance/ Usefulness			Depth of coverage			Presentation			Training Materials			Time allotment			Comments
	Much	Some	None	Very	Partial	None	Too deep	Appropriate	Superficial	Good	Satisfactory	Poor	Good	Satisfactory	Poor	Too long	Good	Too short	
DAY 1																			
DESIGN OVERVIEW - SB																			
DATA MANAGEMENT USING SPREADSHEET & INTRODUCTION TO GENSTAT-PN																			
FORMAL AND INFORMAL SURVEYS-TK																			

General Comment:	
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Daily Evaluation of Activities

We request you to please take a few minutes after each activity to assess the activity based on the criteria given below.

Date.....15/11/2011.....

Thank you.

Topic/Activity	Knowledge acquired			Relevance/ Usefulness			Depth of coverage			Presentation			Training Materials			Time allotment			Comments
	Much	Some	None	Very	Partial	None	Too deep	Appropriate	Superficial	Good	Satisfactory	Poor	Good	Satisfactory	Poor	Too long	Good	Too short	
DAY 2																			
DATA MANIPULATION & EXPLORATION-SB																			
EXPLORATION OF SURVEY AND QUALITATIVE DATA-TK																			
OPTIMAL & INCOMPLETE DESIGNS-PN																			
ANOVA &REML GROUP FORMATION & DATA ANALYSIS-SB																			

General Comment:	
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Daily Evaluation of Activities

We request you to please take a few minutes after each activity to assess the activity based on the criteria given below.

Date.....16/11/2011.....

Thank you.

Topic/Activity	Knowledge acquired			Relevance/ Usefulness			Depth of coverage			Presentation			Training Materials			Time allotment			Con
	Much	Some	None	Very	Partial	None	Too deep	Appropriate	Superficial	Good	Satisfactory	Poor	Good	Satisfactory	Poor	Too long	Good	Too short	
DAY 3																			
RELATIONSHIPS & ASSOCIATION-SB																			
GROUP COMPUTER PRACTIALS & DISCUSSION-ALL																			
GENERALISED LINEAR MODELS-PN																			

GROUP COMPUTER PRACTIALS & DISCUSSION-ALL	
General Comment:	

Daily Evaluation of Activities

We request you to please take a few minutes after each activity to assess the activity based on the criteria given below.

Date.....17/11/2011.....

Thank you.

Topic/Activity	Knowledge acquired			Relevance/ Usefulness			Depth of coverage			Presentation			Training Materials			Time allotment			Com
	Much	Some	None	Very	Partial	None	Too deep	Appropriate	Superficial	Good	Satisfactory	Poor	Good	Satisfactory	Poor	Too long	Good	Too short	
DAY 4																			
LONITUDINAL ANALYSIS- REPEATED MEASUREMENTS-SB																			
LONGITUDINAL ANALYSIS-TIME SERIES- TK																			

MULTIVARIATE ANALYSIS-PN																							
GROUP COMPUTER PRACTIALS & DISCUSSION-ALL																							
General Comment:																							

Overall Evaluation

We request you to please take

Take a few minutes after four days, activities to assess the activities based on the criteria given below

Item	General comments (depth of coverage, usefulness and relevance) and way forward for future training
DESIGN OVERVIEW - SB	
DATA MANAGEMENT USING SPREADSHEET & INTRODUCTION TO GENSTAT-PN	
FORMAL AND INFORMAL SURVEYS-TK	
DATA MANIPULATION & EXPLORATION-SB	
EXPLORATION OF SURVEY AND QUALITATIVE DATA-TK	
OPTIMAL & INCOMPLETE DESIGNS-PN	
ANOVA &REML GROUP FORMATION & DATA ANALYSIS-SB	
REGRESSION ANALYSIS-SB	
GROUP COMPUTER PRACTIALS & DISCUSSION-ALL	
GENERALISED LINEAR MODELS-PN	
GROUP COMPUTER PRACTIALS & DISCUSSION-	

ALL	
LONITUDINAL ANALYSIS- REPEATED MEASUREMENTS- SB	
LONGITUDINAL ANALYSIS- TIME SERIES-TK	
MULTIVARIATE ANALYSIS-PN	
GROUP COMPUTER PRACTIALS & DISCUSSION- ALL	
OVERALL COMMENT ABOUT THIS TRAINING & FUTURE TRAINING	

Appendix V1: Online Evaluation using the survey money.