



CULTURES ANNUELLES

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**Département
des cultures
annuelles
CIRAD-CA**

Programme
cultures
alimentaires

RAPPORT de MISSION

CONSULTATION D'EXPERT PAR LA FAO SUR LES PREVISIONS DE RECOLTE DES PLANTES A RACINES ET TUBERCULES

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HARARE, ZIMBABWE

03 au 06/12/2002

CIRAD-CA
TA 70/16
34398 Montpellier
Cedex 5, France

téléphone :
33-(0)467615962
télécopie :
33-(0)46761444
mel : vernier@cirad.fr

**Philippe VERNIER
Agronome CALIM/RT**

DECEMBRE 2002

Mission numéro : 45224

1. IDENTITÉ DU MISSIONNAIRE

Nom, Prénom : **VERNIER Philippe**
Département : CA, Cultures Annuelles

Programme : Cultures alimentaires, CALIM
Catégorie disciplinaire : Agronomie

2. OBJET DE LA MISSION (2 lignes) : participation à la consultation d'expert sur les prévisions de récoltes des plantes à racines et tubercules organisée par la FAO.

5 mots-clés : racines-tubercules, igname, statistique agricole, prévision de production, expertise.

3. PAYS : ZIMBABWE

Date début : 01/12/2002
(jour/mois/année)

Date fin : 10/12/2002

4. ORGANISMES/PERSONNALITÉS RENCONTRES

ORGANISME	PERSONNALITÉS (NOM, PRÉNOM)	ADRESSES
ITALIE FAO	H. Som Chief, Statistical Development Services-ESSS N. Keita statisticien N. Lutaladio Agricultural Officer (roots & tubers)	Italie, Rome
Ministry of Agriculture and Cooperatives	Mrs. Kajonwan Itharattana Office of Agricultural Economics Mr. Chalit Amnuay Center for Agricultural Information	Thaïlande
CNRA	S. Doumbia agronome système	COTE D'IVOIRE, Man
Service National de statistiques agricoles	NGONDE NSAKALA Robert Directeur	République Démocratique Du Congo, Kinshasa
K.U.Leuven	Prof Eric TOLLENS Depart. Agricultural and Environmental Economics	Belgique
Univ Ibadan	Prof. M.O. Akoroda Dept of agronomy	Nigeria
Minagri	E Mpyisi Food Security Research Project	Rwanda

5. FINANCEMENTS

enveloppe recherche

ressources propres **X**
nature : FAO

6. NATURE DE LA MISSION

(1) encadrement d'agent CIRAD

(2) expertise

(3) congrès séminaire colloque

(4) enseignement et formation

(5) encadrement d'agent non CIRAD

(6) mise en place d'essais

(7) politique scientifique et divers

7. RAPPORT TECHNIQUE DE MISSION

Principaux points de la mission :

Le Statistical Development Services de la FAO avait réuni une dizaine experts (agronomes, économistes et statisticiens) pour proposer des améliorations du système de prévisions de la production des plantes à racines et tubercules destinées au services nationaux de statistiques agricoles des pays du Sud .

Durant cet atelier j'ai présenté une communication "Evaluation of yam production in West Africa. Methodological aspects and agronomic issues to be taken into consideration". (cf. le résumé en annexe).

Les autres (14) communications (études de cas ou aspects méthodologiques) et les débats ont essentiellement porté sur le manioc et de l'igname.

A l'issue de la réunion une série de recommandations a été élaborée pour améliorer les prévisions de récolte. Dans le cas de plantes à récolte multiple ou continue (cas du manioc et de la patate douce dans les systèmes vivriers) l'évaluation directe de la production (par sondage) est recommandée.

Pour les autres situations (igname, manioc industriel, taro..), dont la récolte est unique, la production doit s'évaluer par estimation du rendements et des surfaces en production.

Dans tous les cas un échantillonnage par stratification, appuyé sur une base de données reflétant la structure de production (zone agro-écologique, systèmes de culture, type de variétés.) est un préalable, pour dimensionner au mieux les échantillons enquêtés et réduire les coûts.

Un comité informel (dont je fais partie) sur les statistiques des RTC a été créé pour suivre la mise en œuvre de ces recommandations. L'igname, dont la production est concentrée dans un petit nombre de pays en Afrique de l'Ouest, pourrait être le cas le plus facile à améliorer.

Le compte rendus des débats et les recommandations du séminaires sont données en annexe.

Les actes du séminaires seront publiés sur CD ROM avant la fin 2002.

Annexe 1

Rapport des discussions et conclusions de l'atelier

Opening Session

The Secretary of the FAO Expert Consultation, Mr Naman Keita, called the meeting to order at 08.30 hrs and welcomed the participants. He mentioned that the meeting was a scientific one and hence would like to keep the formalities to a minimum.

The Secretary of the meeting made a number of Programme announcements. He then requested each of the participants to introduce themselves with their name and a short indication of their function and affiliation.

In his brief remarks, the Chief of the Statistical Development Service, Mr Hiek Som, presented an overview of the organizational set up and preceding activities, leading to this Expert Consultation. He also mentioned the different specialisations of the experts that were represented at the Consultation and expressed the hope for a fruitful meeting, looking forward to the various contributions by the participants.

Since the FAO Sub-Regional Representative was unexpectedly called away for an urgent matter, Mr F. Bitanihirwe, Senior Investment Officer, delivered the Opening Address on her behalf. In his speech, he underlined the importance of Root and Tuber crops for Food Security, particularly at the household level. But it was well known that data on these crops have often a low level of accuracy and quality, whilst such data are badly needed for planning and implementation purposes. He further mentioned that FAO has a mandate in the area of crop production data and that FAO had prepared some manuals on the matter but not for collecting data on roots and tubers. He was, however, confident that the participants in the Consultation could contribute to the aim of improving data on roots and tubers and expressed his sincere thanks for their willingness to participate. On a personal note, he added that his own work in formulating investment projects was hampered by lack of adequate data and was therefore much welcoming this initiative.

The Secretary to the Meeting then requested the participants to elect the Chairperson and Rapporteurs of the Expert Consultation. The following officers were elected:

Chairperson:	Prof. M.O. Akoroda, University of Ibadan, Nigeria
Vice-Chairperson:	Ms I. Kajonwan, Ministry of Agriculture, Bangkok, Thailand
Rapporteurs:	Dr Ph. Vernier, CIRAD, Montpellier, France
	Mr B. Chaura, SADC Food Security Unit, Harare, Zimbabwe.

Objectives and Purpose of the Meeting

Mr Hiek Som, Chief of the Statistical Development Service, FAO presented the first paper. He indicated that several efforts had been made in the past and that the subject of this Consultation had been on the list for quite some time, but that there had been insufficient possibilities to get any guidelines for statistics on root crops published.

The purpose of the meeting was to document the various experiences existing in countries such as agronomic aspects, various ways of assessing performance and how to estimate and forecast production. In the long-term the intention was to provide guidelines on root and tuber crop statistics for developing countries. The papers presented at the Consultation may be revised by the authors based on the discussions and reactions during the meeting. It was hoped to identify the key parameters of influence on root crop performance. The expected outcome of the Expert Consultation would be in the first place the papers themselves, then the conclusions arising from the discussions and the recommendations to FAO on the development of actions to be undertaken as guidance for a Plan of

Action. The ultimate objective would be the actual publishing of Guidelines for the collection of data on root crops.

Relevés de conclusion des sessions

Session 1: Importance of root and tuber crops for food security and data use for planning

In National Food Balance Sheets, the various food commodities are usually converted into a single base commodity and this is especially done in case of food cross-substitution. The need for such conversions was questioned and the option to convert all foodstuffs immediately into calories, fats and proteins was considered, taking into account the need to differentiate conversion rates according to Regions. The same breakdown could be used for both supply balance as for food requirement balance. The extent to which substitution can be assumed to take place in practice was considered to be heavily dependent on local and Regional food habits.

Regarding econometric models for forecasting food production, their usefulness was appreciated, but the omission of some variables could render the model less valid. The usefulness of time trend models was appreciated for the short-term, but the longer-term time trend models may lose predictive power. It was suggested that variables might be added that reflect aspects of policy in order that the effects of such policy be reflected. In addition, it was felt that multi-equation models might better reflect the existence of eventual interrelationships.

Session 2 : Agronomic aspects of root and tuber crops

Any methodology for estimating production of root and tubers should assure integration of major agronomic aspects, such as growth period, continuous planting and harvesting, mixed cropping and mixture of varieties, post harvest losses, etc. In particular, due attention should be given to aspects of leave picking, i.e. estimates of production of leaves and the effect of leave picking on the growth and production of roots and tubers.

More in general, the advantages or otherwise of crop-specific surveys versus general purpose surveys was raised and the various opinions on cost and speed were heard and discussed. It was also considered that farmers have a relatively short recall of past production, particularly in case of extended or continuous harvesting. Record keeping with the help of pictograms was an option to be considered. Some countries were attempting to use area estimates and assume the yield for cassava to be more or less constant for some years in order to estimate production. However, this requires substantial local knowledge.

As to the accuracy of production estimates and in view of the existing large farming diversity, it was felt that it would be difficult to adopt a single approach. Wide periods of farm operations or continuous planting and harvesting may be dealt with by determining the mean of the time for each and organize data collection accordingly.

For the yam production estimates, it was agreed that plant density (or rather mound density) was an important variable, changing according to cropping pattern, but less so within an agro-ecological zone. Density could be relatively easily be determined after planting. It could therefore be used in stratification for sampling. However, plant density should also be determined at harvest time, possibly in the form of counting the missing plants or empty mounds. The same applies to sweet potatoes.

After some discussion, it was clarified that always two variables had to be taken into account, i.e. both number of mounds and total planted area. In order to obtain a representative sample, it was considered that inter-farm variation was large and hence a large number of farms would be required rather than large sampling plots. However, the latter requires further methodological investigation, but available experience shows the desirability of recommending a minimum size.

Session 3: Estimation of area, yield, and production of root and tuber crops

The actual methodology used for cassava statistics in agricultural surveys, conducted in Thailand tend to underestimate the production.

Regular recording of farm production through farm book keeping as well as crop cutting may be alternative approaches to improve the estimates.

In some countries (e.g. DRC), cassava leaves contribute significantly to food security of populations, in addition to roots. Therefore, there is a need to improve statistical data on leaves in order to improve the assessment of the food security situation of the populations.

In situations of subsistence farming, harvested production is the most relevant variable for food security. There is also a need to periodically evaluate area planted and yield.

In situations of continuous planting and harvesting, frequent visits to record farmers production provide better estimates than one yearly measurement.

The optimum number of visits and ways of collecting data need to be further investigated for more cost-effective systems.

Stratification should be used in order to reduce sample size and cost of surveys.

Use of local measurement units requires proper calibration in order to provide metric equivalence.

It appears that various common local names with different meanings are often used for root and tuber crops. Therefore, it was proposed that in reporting statistics Latin names be added to common names of products

The use of alternative methods of estimating area was discussed following the presentation of Paper 14. It was proposed that comparative studies be undertaken on cost-effectiveness of the alternative approaches (including use of GPS) as compared to traditional methods.

The appropriate institutional set-up for producing agricultural statistics was also discussed (centralized versus decentralized systems). It was recognized that there is no absolute best solution. Each country needs to adopt a more appropriate solution.

Session 4: Estimation of crop losses in root and tuber crops (Agenda item 8: paper 15)

The various components and causes of losses were discussed.

It was found that little experience on documentation exists on losses and the methodology being tested in Malawi was found encouraging.

There is need for further methodological research on losses and also the concept needs to be better defined.

The importance of losses for food balance sheets was recognized.

Special Panel Discussions

Two parallel panel groups were formed as follows:

- **Panel Group on Roots/Cassava**
 - Facilitator: Prof. E. Tollens
 - Reporter: Mr B. Chaura
 - Members: N Keita; L M Machirovi; E Mpyisi; F Ngopya; N Ngonde;
 - N Lutaladio; A Chalit; K Ltharattana; V Sandifolo
- **Panel Group on Tubers (yam, sweet potatoes, taro)**

- Facilitator: S. Doumbia
- Reporter: P. Vernier
- Members: M Akoroda; M Nyoni; J Rikjs; H Som

Depending on the main use of the production the following classification and related concepts and methods of data collection is proposed:

Main Use of Production	Number of . Harvest	Mixture	Concept of Production	Region	Method
Total or Mainly market	one	Pure	Production harvested	Asia; emerging Africa, Latin America	Interview + crop cuts at harvest time
Mainly food Reserve; mixed; commercial and subsistence	Several	Mainly mixture with cassava dominant	Production harvested + potential	Africa + part of Latin America	Interview (Recording harvest in local units) + a few crop cuts (for potential production)
Mainly subsistence remote areas or land locked	Several + partial	Mixture	Production harvested + potential	Africa + part of Latin America	Interview (Recording harvest in local units) + a few crop cuts (for potential production)

Conclusions and Recommendations

General considerations

Root crops are gaining importance as food and cash crops

Root crops have advantage in term of food security due to their tolerance to drought (no critical growing period contrary to cereal crops).

Cassava 1st Root crop in terms of spread and quantity in Africa & S.E. Asia
Yam – 2nd root crop in Africa

Balance sheet to include all foods – not just dominant foods

General Recommendations of the workshop

- To reduce costs at acceptable precision, stratification based on cropping and production patterns should be used in statistical surveys.
- Stratification should be based on administrative units at the least or agro-ecological units/zone at best.
- Each survey design should be crop specific, where possible.
- To estimate production distinction should be made between harvesting patterns
- For single harvested crops (e.g. : yams, sweet potatoes, Irish potatoes, taros) estimation of production can be obtained by multiplying area and yield estimation (through crop-cutting).
- For continuous harvested crops (such as cassava production in Central Africa) production should be estimated directly by periodical measurements of harvested quantities.
- Units used for quantifying food into the balance sheet should be standardized for easier comparison among country using such standards as calories, proteins, fat....

- h. Adopt Latin names in addition to local/common names when referring to crops.
- i. Studies should be undertaken to develop country/location specific coefficients for quantifying root crops in NFBS
- j. Explanatory notes should accompany data for appropriate use and understanding of National Food Balance Sheets. quantify post-harvest losses and adjust figures appropriately for food availability particularly for root crops.
- k. All forms of the products available should be taken into consideration (including leaf consumption as for cassava).
- l. Determine extent of commodity cross-substitution in consumption acceptable to the population.
- m. Simple econometric models are not adequate; rather use of multi-equation simulations should be encouraged
- n. Providing data as a range rather than a single/specific number (e.g. CV, Std. Dev, or margins).
- o. Cross price elasticity's – competing crops can affect the production of root and tubers and this should be taken into account where applicable
- p. Stakeholders (agronomists, economists, statisticians) should learn about each other's concerns for better estimation of production,
- q. Advisable to use a large sample size because of heterogeneity of yam production.
- r. Improve production data using farm records from the farmer where applicable.
- s. Use local measuring units (e.g. sacks, basins, etc.) and conversion factors where standard weights are not applicable.
- t. For large sampling populations the number of farms sampled is more important than the sampling fraction.
- u. Knowledge of measures of dispersion is important for determining optimum sample size for surveys.
- v. Consider alternative (but statistically valid) approaches when working with limited resources.
- w. Countries and donors need to invest more resources in root and tuber crops statistics.
- x. Conduct more studies on the use of GPS for area estimation.
- y. Emphasize coordination among all statisticians, agronomists and economists involved in agricultural statistical work.
- z. For promoting and attracting support for agricultural statistics it is important to clearly define capital and recurrent costs.

INFORMAL COMMITTEE FOR ROOT CROP STATISTICS

Informal committee to follow-up RTC statistics is proposed to be set up. It will be composed of 7 people:

M. O. Akoroda
Eric Tollens
Naman Keita – Secretary
N. B. Lutaladio

Kajonwan
Philippe Vernier
B. P. Chaura

Annexe2 – List of Documents



FAO STATISTICS DIVISION AND REGIONAL OFFICE FOR AFRICA (ESS/RAF)

Expert Consultation on Root Crop Statistics

(Harare, Zimbabwe, 3-6 December 2002)

LIST OF DOCUMENTS

Doc.No.

RTCStat-Info 1	Information Note
RTCStat-Info 2	Tentative Agenda and Timetable
RTCStat-Info 3	List of Documents
RTCStat-1	<u>Paper 1:</u> Presentation of meeting objectives, purpose and outcome expected by H. Som , Chief, Statistical Development Service (ESSS), FAO
RTCStat-2	<u>Paper 2:</u> Overview of Previous FAO Activities, Outcome and Recommendations by J. Q. Rijks , Statistician, Consultant, ESSS
RTCStat-3	<u>Paper 3:</u> Importance of root crops in Africa by F. Ngopya , Statistician, FAO-SAFR
RTCStat-4	<u>Paper 4:</u> Quantification of Rootcrops in National Food Balance Sheets and Problems encountered by B. Chaura , Senior Statistician, REWU/SADC, Zimbabwe
RTCStat-5	<u>Paper 5:</u> Use of root crops statistics for planning by Dr I. Kajonwan , Expert on Policy and Plan Analyst, Thailand
RTCStat-6	<u>Paper 6:</u> Agronomic Aspects of Root and Tuber Crops and their importance in estimating production by N. Lutaladio , Agricultural Officer (roots and tubers) AGPC, FAO
RTCStat-7	<u>Paper 7:</u> Agronomic aspects of root and tuber crops important for estimating production: cassava and sweet potato in relation to time and input variables by Prof. M. Akoroda , University of Ibadan, Nigeria
RTCStat-8	<u>Paper 8:</u> Evaluation of yam production in West Africa. Methodological aspects and agronomic issues to be taken into consideration by Ph. Vernier , Agronomist, Food Crop Programme, CIRAD, France.
RTCStat-9	<u>Paper 9:</u> Agronomic aspects of root and tuber crops important for estimating production by Sékou Doumbia agronomist, CNRA, Côte d'Ivoire

RTCStat-10	<u>Paper 10:</u> Estimation of Area, Yield and Production of Root and Tuber Crops in Thailand by A. Chalit , Director, Centre for Agricultural Information, Thailand
RTCStat-11	Papers 11 & 12 (joint presentation): Root and Tuber Crops in DRC: Importance for Food Security and Contribution to the improvement of statistics by R. Ngondé , Director, National Agricultural Statistics Service, DRC
RTCStat-12	Report on a field experience "Estimation of area, yield and production of cassava in Bandundu (1987-1988) and Bas Congo (1988-1989) regions by an intensive yearlong, weekly visit, production and marketing survey, on a large sample, as compared to official RDC statistics" by Prof. E. Tollens University of Leuven, Belgium
RTCStat-13	<u>Paper 13:</u> Root and Tuber crops: Concepts and methods recommended by FAO and operational issues by N. Keita, Statistician, ESSS/FAO
RTCStat-14	<u>Paper 14:</u> Estimation of Area, Yield and Production of Root and Tuber Crops in Rwanda by E. Mpyisi, Head of Food Security Research Project (and Research Assistant of MSU), Ministry of Agriculture, Animal Resources and Forestry, Rwanda
RTCStat-15	<u>Paper 15:</u> Contributions by invited Agencies USDA-Harare, CSA-Ethiopia, Zimbabwe, a.o. (to be confirmed).
RTCStat-16	<u>Paper 16:</u> Estimation of crop losses in root and tuber crops; The case of Malawi by V. Sandifolo, Integrated Project Specialist, IITA/SARRNET, Chitedze, Research Station Malawi

Annexe 3 :

Résumé de la Communication présentée par Philippe VERNIER, agronome CIRAD à

FAO Expert Consultation on Root Crop Statistics
(Harare, Zimbabwe, 3-6 December 2002)

Résumé : Evaluer la production d'igname en Afrique de l'Ouest. Aspects méthodologiques et caractères agronomiques à prendre en considération.

Les plantes à racines et tubercules (RT) sont une composante essentielle de la sécurité alimentaire des pays du Sud, aussi bien en milieu rural que dans les villes, ainsi qu'une source de revenu importante pour beaucoup de producteurs souvent parmi les plus pauvres. Parmi ces RT, les ignames jouent un rôle majeur notamment en Afrique de l'Ouest et du Centre. L'évaluation de la production et des rendements de cette plante pose des problèmes spécifiques liés à sa biodiversité (plusieurs espèces) et à son mode de conduite (récolte unique/double). Sur la base de l'expérience acquise lors d'études sur les systèmes de production menées de 1995 à 2000 au Bénin, cette communication s'attache à identifier et hiérarchiser les facteurs à prendre en compte pour constituer un échantillon représentatif permettant d'évaluer le plus justement possible les rendements unitaires. Des méthodes pratiques pour estimer les surfaces cultivées sont proposées.

Abstract : Evaluation of yam production in West Africa. Methodological aspects and agronomic issues to be taken into consideration.

In developing countries root and tuber crops (RTC) are an essential component of food security in rural as well as in urban areas. In addition, they are a source of cash for a lot of farmers, often the poorest ones. Among the RTC, yams play a major role, especially in West and Central Africa. Perusal of yield and production data raises certain issues related to its biodiversity (several species involved) and cropping technique patterns (e.g. single/double harvest). On the basis of experience gathered in research work carried out on yam based cropping system between 1995 and 2000 in Benin, this presentation attempts to identify and to prioritize factors to be taken into consideration to develop a dataset allowing to estimate unitary yields as precisely as possible. Practical methods for evaluating the area cultivated to yam are also proposed.



Visite de la Horticulture research station de Marondera