

Content on Agricultural Research Organisation Web Sites: A Study of International Trends

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Web sites have become essential tools in the dissemination of content in digital format, especially in organisations where the generation, management and distribution of information and knowledge are among the major activities. This should also be true in agricultural research organisations, where information and knowledge are the major by-products of agricultural research. This point is supported by the results of a content survey of 28 Web sites of international agricultural organisations, eight Web sites of regional-based agricultural research organisations in Africa and 21 Web

sites of organisations involved in agricultural research in the Southern Africa Development Community (SADC). Overall, international agricultural organisations are way above agricultural research organisations in Africa and the SADC region in the use of Web sites in providing access to information and knowledge resources in digital formats. Agricultural organisations in Africa and the SADC region are generally behind in implementing innovative use of the Web. They need to be guided in the development and provision of digital information services using the Internet and Web technologies.

Introduction

A large number of corporate organisations in the world today are using the Internet and the Web to promote their products to potential clients; to deliver digital services and information to their employees, clients, suppliers and partner organisations; to conduct and manage business transactions (electronic commerce); and to facilitate communications within the corporation and with external organisations and individuals. However, the use of the Internet and Web-based tools, especially Web sites in the provision of access to digital information and knowledge resources is not a monopoly of corporate organisations. Many organisations including academic institutions and government departments have also realised the benefits they could derive from the use of Web-based tools. They are implementing differ-

ent types of Web sites and using them to provide information services and to communicate with their staff, clients, citizens, students, and in some cases the general public. Slowly, Web sites are becoming essential tools for information and knowledge management, especially in organisations where generation, management and distribution of information and knowledge are among the major activities. This should also be true of agricultural research organisations.

Agricultural research includes research on fish, trees, as well as crops and livestock and natural resources (ISNAR 2002), and the primary benefit from agricultural research is improved production (Johnson 2001). However, the major by-products of agriculture research are information and knowledge. Therefore, the premise of this paper is that agricultural research organisations could benefit a lot from the use of Web sites in the

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provision of access to information and knowledge which they generate, and a good number of international agricultural research organisations are indeed already using the Web to provide access to their information and knowledge products. However, due to a variety of factors the situation may not be the same in Africa.

As part of the doctoral research on the nature and potential application of information portals in the provision of value-added, Web-based agricultural information services to researchers in the Southern African Development Community (SADC) countries, a survey was conducted to identify the global trends in the provision of digital information resources and services on publicly accessed Web sites of agricultural-based organisations and compare these with the situation obtaining in Africa, with emphasis on the SADC region.

The SADC has 14 member states and these are Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. For practical reasons, only countries that have English as the official language or as one of the official languages were included in the survey. This being the case, Angola and Mozambique, whose official language is Portuguese, and DRC, whose language is French, were excluded from the survey.

The survey

The survey examined freely accessible Web sites of international governmental organisations (IGOs) and international non-governmental organisations (NGOs) involved in agricultural research or agricultural information management. International organisations were chosen for the study on the assumption that they have adequate funding, skilled human resources and viable information and communication technology (ICT) infrastructure to implement innovative use of the Internet and Web technologies. It was expected that the findings of the survey would provide reliable indications regarding the global trends in the provision of digital information resources and services on agricultural Web sites and a basis for comparison.

Web sites of regional organisations, located or operating in Africa, involved in agricultural research were also surveyed.

Methodology

The survey involved the identification and examination of Web sites of international organisations, regional organisations in Africa and organisations located in the SADC region that are engaged in agricultural research and agricultural information management. The following 11 variables were used:

- Electronic publications
- Online databases
- Tools
- Discussions forums
- Information retrieval facilities
- Data sets
- Online staff directories
- Links to useful resources
- News and events
- Journals
- Newsletters

Sampling

The following two Web-based international directories were examined in detail as their contents were seen to be relevant to the survey:

- Agricultural Research on the Web (AROW)
- Yahoo! Directory on agriculture

AROW

AROW (<http://www.isnar.cgiar.org/arow/>) is a worldwide directory of organisations and universities engaged in agricultural research that have a presence on the Web. AROW was developed by the International Services for Agricultural Research (ISNAR). [1] Founded in 1979 and headquartered in The Hague, the Netherlands, ISNAR's mission is to help bring about innovation in agricultural research institutions to increase their contribution of research to agricultural development for the poor (ISNAR 2001). ISNAR maintains the AROW directory in association with the Web based Information System for Agricultural Research for Development (WISARD) – <http://www.wisard.org> – of the International Agriculture Centre (IAC) of the Wageningen Uni-

versity and Research Centre based in the Netherlands.

The AROW directory allows for searching and browsing of records. Searching can be done on Web addresses, organisation title, acronym, and country. Browsing of records is by region, regional organisations, international organisations, and individual countries. At the time of the survey November – December 2002, AROW listed several Web sites of national agricultural organisations from 132 countries in Africa, Asia, Europe, Middle East, Oceania, Latin America, Caribbean and North America. The directory also included 29 Web sites of international organisations and 43 Web sites of regional agricultural organisations. The distribution of regional organisations' Web sites was as follows: 12 sites from Africa, 11 from Asia, 6 from the Caribbean, 4 from Europe, 9 from Latin America and 1 from the Middle East.

Yahoo! Agricultural directory

Yahoo is the Web's oldest online directory. It was launched in 1994 by Stanford University's Ph.D. students, David Filo and Jerry Yang, and was the first online navigational guide to the World Wide Web resources (Yahoo 2001). Web site entries in the Yahoo! Directory (<http://dir.yahoo.com>) are organised by human editors into categories, making it easier to narrow and refine search queries (Search Engine Watch 2002).

At the time of the survey, the Yahoo! Directory listed 2257 categories of Web sites under agriculture and these included 69 agricultural research centres. The entries of the centres were examined in order to identify sites of international agricultural organisations and those based in Africa and the SADC region in particular that could be included in the survey. The following observations regarding the contents of the Directory were made:

- Sixteen Web sites under the Consultative Group on International Agricultural Research (CGIR) featured prominently among the Web sites of international agricultural research organisation listed in the Yahoo! directory. These sites were also listed in AROW.
- A large number of the Web sites listed in the Directory belonged to national universities and institutions in the United States of America
- Almost all the Web sites of international agricultural research organisations listed in the Directory were also included in the AROW directory

- Out of 11 SADC countries included in the survey, only South Africa and Zambia had one entry each among the 69 Web sites of research centres listed in the Directory.

Considering the above AROW was used for identifying Web sites to be included in the survey. In addition, AROW's categorisation of Web sites made it easier for the identification of Web sites for possible inclusion in the survey.

Sample populations

International agricultural organisations

Twenty-eight Web sites of international agricultural organisations listed in the AROW directory at the time of the survey (Appendix 1) were included in the survey. The Web site of Future Harvest was excluded. The decision to drop Future Harvest was based on the nature of its work and the fact that the Web sites of all the 16 centres that created and supported Future Harvest were included in the survey.

Regional agricultural organisations in Africa

As indicated above, AROW listed 12 regional agricultural organisations from Africa and others from outside Africa but whose activities target Africa. After a preliminary check of all the 12 Web sites, sites of the following four organisations were excluded from the list due to the reasons indicated below:

- Arab Organisation for Agricultural Development (AOAD) – the Web site was only available in the Arabic language
- Banana Research Network for Eastern and Southern Africa (BARNESA) and Musa pour l'Afrique centrale et occidentale (MUSACO) – the two Web sites are part of the Web site of the International Network for the Improvement of Banana and Plantain (INIBAP). The site was to be covered under the international organisations' Web sites
- Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training (SACCAR) – the Web site had only a page with a logo, and nothing else to write about.

After excluding the above Web sites, the sites of the following remaining 8 regional organisations were included in the survey:

- Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) URL: <http://www.asareca.org/>
- Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) URL: <http://www.aarinena.org/>
- Conférence de Responsables de Recherche Agronomique Africains (CORAF) URL: <http://www.coraf.org/>
- Department for International Development (DFID) East Africa, Natural Resources Research and Development Coordination Office (NIDA) URL: <http://www.nida.or.ug/index.htm>
- Institut du Sahel (INSAH) URL: http://www.insah.org/start_inсах.htm
- Special Program for African Agricultural Research (SPAAR) URL: <http://www.worldbank.org/afr/aftsr/>
- The International Trypanotolerance Centre (ITC) URL: <http://www.itc.gm/>
- Comité permanent Inter Etats de Lutte Contre la Sécheresse dans le Sahel (CILSS) URL: <http://www.cilssnet.org/>

Agricultural organisations in the SADC region

The AROW directory categorised Web sites for each country under *research institutions* (agricultural or related institutions involved in agricultural research), *universities* (institutes, faculties of agriculture or related areas, i.e. fisheries, forestry) and *others* (ministries of agriculture or related areas, i.e. fisheries, land, forestry). Further it was noted that in some cases AROW listed Web sites of affiliated institutions or departments/divisions under the parent organisation, even though these could be found under the same domain name and in most cases on the same Web server. In all such cases only the Web site of the parent organisation was counted for the purpose of this survey. Altogether, 58 entries of Web sites from the SADC member states were found in the AROW directory.

All the 58 Web sites from the SADC region were examined in order to select sites that qualified for the survey. The following categories of Web sites were to be included in the survey:

- All Web sites falling under the *research institutions* category
- Web sites of research departments, institutes or divisions attached to the ministries of agriculture and other related ministries, that were listed under the *others* category

Table 1: Distribution of Web sites from the SADC region in the AROW directory

SADC member state	Total entries in AROW	Number of sites selected
Botswana	5	2
Lesotho	1	0
Malawi	2	0
Mauritius	10	5
Namibia	4	1
Seychelles	0	0
South Africa	22	8
Swaziland	0	0
Tanzania	8	3
Zambia	2	1
Zimbabwe	4	1

- Web sites of universities that had schools or faculties of agriculture with a visible information service on the site targeting academics and researchers
- Web sites of agricultural colleges or institutes or universities

Several Web sites were excluded from the survey because they either had broken links and could not be located; or were under construction and had only one single Web page; or belonged to organisations not involved in agricultural research as defined in the study. As a result the number of sites eligible for inclusion in the survey was reduced from 58 to 21. The distribution of the Web sites by countries is shown in Table 1, while Appendix 2 gives a list of the 21 Web sites that were included in the survey.

Findings of the survey

Table 2 presents a summary of the contents of the Web sites.

Electronic publications

The use of the Internet and World Wide Web technologies is allowing organisations to provide their employees, clients and partners access to full text documents in digital format via their Web sites. In the survey, 27 (96%) Web sites of international organisations provided access to a variety of full-text documents in digital formats, mainly in portable document format (PDF) and HyperText Markup Language (HTML) formats. Examples of documents provided include:

Table 2: Summary of survey results of Web sites

Variables	International Organisations		Regional Organisations in Africa		SADC Organisations	
	Present	Absent	Present	Absent	Present	Absent
Electronic publications	27 (96%)	1 (4%)	6 (75%)	2 (25%)	11 (52%)	10 (48%)
Online databases	25 (89%)	3 (11%)	3 (37.5%)	5 (62.5%)	7 (33%)	14 (67%)
Tools	9 (32%)	19 (68%)	0 (0%)	8 (100%)	1 (5%)	20 (95%)
Discussion forums	7 (25%)	21 (75%)	0 (0%)	8 (100%)	0 (0%)	21 (100%)
Info. retrieval facilities	28 (100%)	0 (0%)	3 (37.5%)	5 (62.5%)	11 (52%)	10 (48%)
Data sets	3 (11%)	25 (89%)	0 (0%)	8 (100%)	0 (0%)	21 (100%)
Online staff directory	7 (25%)	21 (75%)	0 (0%)	8 (100%)	2 (10%)	19 (90%)
Links to resources	28 (100%)	0 (0%)	7 (87.5%)	1 (12.5%)	14 (67%)	7 (33%)
News	28 (100%)	0 (0%)	4 (50%)	4 (50%)	8 (38%)	13 (62%)
Events	21 (75%)	7 (25%)	5 (62.5%)	3 (37.5%)	2 (10%)	19 (90%)
Journals	1 (4%)	27 (96%)	0 (0%)	8 (100%)	1 (5%)	20 (95%)
Newsletters	28 (100%)	0 (0%)	5 (62.5%)	3 (37.5%)	4 (20%)	17 (80%)

- Annual reports by almost all the 27 organisations
- Training modules, i.e. on scientific writing and presentation, research program formulation, strategic planning and many more, by ISNAR
- Manuals and guides like the *Fertiliser Manual* and a *Guide to Fertiliser Products* by the International Fertiliser Development Centre (IFDC)
- Conference papers or proceedings by the International Food Policy Research Institute (IFPRI) and International Institute of Fisheries Economics and Trade (IIFET)
- Technical papers, articles and monographs by the Centre for International Forestry Research, ISNAR and INIBAP.

In addition to full-text digital documents, Web sites of some organisations such as the CGIAR, International Centre for Tropical Agriculture (CIAT), International Crops Research Institute for Semi Arid Tropics (ICRISAT), and International Fund for Agricultural Development (IFAD) also provided photo albums or image galleries, and in some cases video clips.

The survey revealed that some regional organisations in Africa are also taking advantage of the Internet and the Web and are providing access

to full-text documents in both PDF and HTML formats on their Web sites. Out of the 8 Web sites surveyed 6 (75%) provided access to full-text documents, and these included:

- Annual reports by SPAAR
- Texts of agricultural policies of member states by NIDA
- Strategic plans by ASARECA and CORAF
- Workshop reports by ASARECA
- Minutes of the organisation's meetings by AARINENA
- Annual statistical bulletins by CILSS.

It was generally observed that in most cases the number and variety of documents provided on some Web sites were very limited. Some of the regional agricultural organisations are involved in research activities and projects that are generating a lot of information and knowledge documents such as technical research reports, fact sheets, how-to-do manuals, and many more. However, these types of documents were conspicuously missing on the Web sites.

Regarding SADC-based Web sites, 11 (52%) provided access to full-text documents, notably the following:

- Annual reports by the Food and Agriculture Research Council (FARC) of Mauritius
- Strategic plans in MS-Word format by the Agricultural Research Council (ARC) of South Africa
- Statistical information for food crops by the Agricultural Research and Extension Unit (AREU) of Mauritius
- Articles and books on sugar by Mauritius Chamber of Agriculture (MChA)
- Minutes of the management committee of the Faculty of Agriculture at the Free State University.

Like in the case of regional organisations, it was also noticeable that the variety and number of full-text documents being provided on the sites was very limited. From the inquiries made to some organisations to find out the reasons why much local content was not being published on their Web sites, it emerged that:

- Much of the content that could be published on the Web sites was in print format and the organisations do not have the capacity and facilities to convert the documents to digital format

- The Web sites are being developed on an ad hoc basis and have not been integrated into the workflow of the organisations to ensure that appropriate content is published on the regular basis
- There is a shortage of skilled manpower to handle the publishing of content on the Web sites.

There is need for research organisations in Africa and the SADC region; in particular, to provide access to as much locally produced information content as possible as this is one of the ways that their contribution to agricultural research and development will be noticed. Organisations should provide access to articles produced by the organisation and the researchers, technical guides, posters, models, and other relevant materials. By doing this, they will also be contributing to the development of useful content from Africa on the information superhighway.

Online databases

The advent of the Internet, intranets and extranets has now made it possible for organisations to provide access to electronic databases developed using different proprietary software systems via a single user access interface, the Web browser. In the survey, 25 (89%) international agricultural organisations provided access to various types of online databases on their Web sites. These include the following:

- Online Public Access Catalogues (OPACs) by the Centre for International Forestry Research (CIFOR), World Fish Centre, International Maize and Wheat Improvement Centre (CIMMYT), International Livestock Research Institute (ILRI) and the International Water Management Institute (IWMI)
- Specialised databases like POLEX databases (Forest Policy Experts) by CIFOR; Agroforestry and Botanical Nomenclature databases by the World Agroforestry Centre (ICRAF); Plant Genetic Resource Database by International Centre for Tropical Agriculture (CIAT); Rural Poverty Knowledgebase by IFAD; Rice Knowledge Bank by International Rice Research Institute (IRRI); and Experts Databases by IWMI
- Databases of publications and catalogues by the International Institute of Tropical Agriculture (IITA), CIAT, INIBAP, ILRI and ICRAF.

Regarding regional organisations in Africa, provision of access to online databases was available on 3 (37.5%) of the Web sites surveyed. Databases provided were mainly directories and they

included the directory of national agricultural research systems (NARS) by ASARECA, the directory of agricultural research institutions by AARINENA, and the directory of African agricultural research by SPAAR.

In the SADC region, out of the 21 organisations surveyed only 7 (33%) provided access to databases via their Web sites. These included three universities – University of Natal (now University of KwaZulu-Natal), Pietermaritzburg, University of the Free State and the University of Zimbabwe – that provided Web access to their libraries' OPACs. The University of Zambia provided telnet access to its OPAC. Other databases accessed on the Web were:

- SADC Agribase – a database covering agriculture and related subjects, mainly relating to the Southern African region by the University of the Free State Library
- A searchable glossary of terms of the Agricultural Georeferenced Information system (AGIS). AGIS is a collaborative project between the South African National Department of Agriculture, Provincial Departments of Agriculture, and the Agricultural Research Council (ARC)
- GADI Projects – a database for current, completed and/or archived projects by the Grootfontein Agricultural Development Institute (GADI)
- CSIR Publication lists – a database of references of peer-reviewed journal articles published by South Africa's Council of Scientific and Industrial Research (CSIR) scientists from 1997.

Taking into account the fact that most agricultural research organisations have libraries and documentation centres some of which have developed various bibliographic databases, the number of institutions providing access to databases via the Web was too low. Bibliographic databases serve as guides or pointers to the availability and location of information resources, and therefore access to such useful resources should be made available via the Web. In addition, databases providing access to information on agricultural research experts or scientists, research results, projects, and publications should also be made accessible via the Web.

Tools and software

Provision of access to various useful tools, models and software via the Web makes distribution very easy and ensures that the tools are accessed

whenever they are needed. Out of 28 international Web sites surveyed only 9 (32%) provided access to tools that could be downloaded from their Web sites. Examples included:

- CIFOR criteria and indicators template for sustainable forest management
- ICRILEX: English to French Lexicon for translating agricultural resource terminology by ICRISAT
- Practical anthropometry 101 and 102, tools and resources for nutritional assessment and survey by IFAD
- DIVA-GIS, free GIS software by the International Potato Centre (CIP)
- PODIUM – the Policy Dialogue Model software that runs on a personal computer developed by IWMI. PODIUM maps the complex relationships between the numerous factors that affect water and food security, and displays information clearly, in both graphic and tabular formats.
- WinDisp, software package for the display and analysis of satellite images, maps and associated databases, with emphasis on early warning for food security, by the Food and Agricultural Organisation (FAO)
- IRRISTAT, a computer program for data management and basic statistical analysis of experimental data; and WinBoot, designed to analyse DNA fingerprints (restriction fragment length polymorphism [RFLP] banding patterns) of rice pathogens, both developed by IRRI.
- Identify and Classify Local Indicators of Soil Quality, a methodological tool developed by CIAT for use in Latin America and Africa to identify and classify local indicators of soil quality related to permanent and modifiable soil properties.
- INFORM-R – a management information system (MIS) developed by ISNAR.

In sharp contrast, none of the regional organisations provided access to tools and only 1 (5%) SADC based organisation provided access to a couple of tools for downloading on its Web site. The following tools were available on the Web site of Grootfontein Agricultural Development Institute (GADI):

- SM2000 – a Microsoft Excel based simulation model for the calculation of profitability of different small stock enterprises at the gross margin level.
- VIAPRO SG – a Microsoft Excel spreadsheet developed for viability projections of either sheep or goat farming enterprises from extensive agricultural grazing land. The projection is done for a 20-year period.

The absence of appropriate tools and software for downloading on the Web sites of regional and

SADC based agricultural organisations could be due to a number of reasons. This could be due to the fact that either the organisations have not developed any tools that could be shared via the Web or they have the tools but there is not enough demand to have access to them, via the Web, from the staff and partners.

Discussion forums

In spite of the opportunities presented by Web based discussion forums in sharing information and knowledge, the survey revealed that only a small number of international agricultural organisations have taken advantage of the facilities. Out of the 28 Web sites surveyed only 7 (25%) provided such facilities and these are sites of the FAO, CIFOR, the Global Forum on Agricultural Research (GFAR), International Society of Sugar Cane Technologists (ISSCT), International Soil Reference and Information Centre (ISRIC), and the International Food Policy Research Institute (IFPRI).

As for Africa and SADC based organisations, none of them provided access to Web based discussion forums. This is quite regrettable in view of the fact that all the regional organisations have members located in different countries and discussions forums could be an effective way of involving members in their activities. Unlike electronic mail based discussion forums, Web-based discussion forums have the added advantage of providing access to the archives of the various contributions to the discussions.

Information retrieval tools

Information discovery on Web sites should be easier for end-users in order to enable them locate the various resources and services available on the site. This fact seems to have been noted by international agricultural organisations. All 28 (100%) Web sites of international organisations provided some form of search facility or resource discovery tools on their Web sites, i.e. sitemaps, local search engines or categorisation of information resources for easy browsing. In sharp contrast, only 3 (27.5%) Web sites of regional organisations in Africa had implemented search facilities and 11 (52%) of the SADC Web sites provided such facilities.

One major reason as to why a good number of Web sites of Africa and the SADC are without search facilities could be that most of the sites are very small. The sites are made up of very few documents and resources for search facilities to make a difference.

Data sets

Only 3 (11%) of the Web sites of international organisations provided access to data sets, while none among the African region and SADC-based organisations did so. This could be due to several reasons. May be the organisations are not involved in activities requiring sharing of data and or they are not just willing to share data via the Web.

Agricultural research organisations in Africa should be encouraged to share research data. Access to research data will avoid duplication and unnecessary spending of funds on collecting data already available for analysis. It will allow researchers in the region to speed up the translation of research results into knowledge and procedures to improve agricultural production.

Online staff directories

The survey revealed that provision of access to "static" staff lists on Web sites is still continuing in most organisations. Around 13 (46%) of the International Web sites provided access to staff lists, 7 (25%) provided searchable staff directories and 7 (29%) did not provide any staff information. As for the African regional Web sites, only 1 (12.5%) provided a static list and the remaining 7 (87.5%) did not do so. In the case of the SADC region, 10 (52%) provided "static" staff lists, 2 (10%) searchable directory and 8 (38%) did not provide any information.

The low number of organisations providing searchable staff directories in the three cases could be attributed to the fact that most of them do not have a large number of staff compliments to warrant a searchable directory. This could also explain the reason for the large number of organisations providing access to static staff lists. It should also be noted some organisations may have in place a policy not to provide staff contact information on their Web sites. In such cases, a general contact e-mail address is provided.

Links to useful external resources

The survey revealed that international organisations are taking full advantage of the free access to various information resources provided by the Web publishing model. All the 28 (100%) Web sites surveyed provided links to information resources hosted by other organisations. In general external links were made to the following types of resources:

- Online databases and information systems like AGRICOLA, AGRIS, FAOSTAT (FAO statistical database), ReefBase and many others
- Online publications in full-text, i.e. electronic journals, magazines, newsletters, conference reports and proceedings, and many others
- Web sites of other organisations involved in similar or related activities.

Regarding Africa and the SADC regions, 7 (87.5%) and 14 (67%) respectively provided links to other information resources available on the Web. Regional organisations mainly provided links to electronic publications available on Web sites of international agricultural organisations. For example:

- AARINEBA linked to publications by International Centre for Agricultural Research in the Dry Areas (ICARDA), FAO, CGIAR, GFAR and ISNAR
- INSAH provided links to publications by ISNAR; while
- CILSS linked to publications by FAO, FewsNet and Club du Sahel.

The International Trypanotolerance Centre (ITC) provided links to Web sites of international organisations and governments that are funding the Centre's research and development work. These included the European Union, FAO, the Belgian Government, African Development Bank, and the International Development Research Centre (IDRC) of Canada. SPAAR also linked to agricultural research organisations that, although based elsewhere, work extensively on African issues, while ASARECA also linked to two separate Web sites of its associated programmes and networks – FoodNet and the Eastern and Central Africa Programme for Agricultural Policy Analysis (ECAPAPA). The two sites provided access to several types of full-text documents and informa-

tion including FoodNet annual reports, mid-term reports, and Uganda market prices information.

CORAF was the only organisation that did not provide links to other resources on the Web. However, it should be noted that its *Autres Sites* page where the resources were to be listed was under construction at the time of the survey.

The 14 SADC based organisations provided links to different types of information resources. These included links to selected agricultural-based subject gateways on the sites, i.e. the University of Zambia linked to *AGRIGATE* – an agricultural information gateway for Australian researchers; and the University of Natal to *Agri INFO* – a collection of technical publications related to beef, diary and maple production. It was observed that the University of Natal provided links to several electronic journals and databases and access to these is mainly available to staff and registered university students. These included electronic journals such as *Acta Horticulture*, *Agricultural Economics*, *Agricultural and Water Management* and many more by; and database services such as EbscoHost and SwetWise.

News

All 28 (100%) Web sites of international organisations provided news or news facilities. These took different formats and titles like media coverage and media releases by CIFOR; online newsroom and newsroom by ICRAF and CIAT respectively; press releases by ICARDA, CIP and ICRISAT; and notice board by the International Union of Forestry Research Organisations (IUFRO).

Four (50%) regional organisations from Africa provided news items on their Web sites. The news included updates on various activities by CILSS; announcements of changes in management staff by ITC; highlights of activities and announcements of new appointments by AARINENA; and coverage on the launching of the Foundation for Sustainable Development of the Sahel by INSAH.

Among the SADC organisations, only 8 (38%) provided a link to news items on their Web sites. In most cases these were in form of *press releases* or *what is new?* There were cases in which the only news items provided on the site were outdated, i.e. news items available on the Web site of the Department of Agricultural Research in Botswana during the survey were for 1999. This fact

raises questions regarding the frequency of updates of information on some of the Web sites that were surveyed in the SADC region.

Events

Like in the case of news all the 28 (100%) international organisations were found to be using the Web to announce various events to visitors to their sites. For example, some of the major events covered on the sites included workshops by ICRAF, meetings by CGIAR and IFAD and conferences by CIMMYT, EFRN, and IIAT.

Regarding Africa region and SADC based organisations, the situation was found to be different. Only four (50%) of the regional organisations' Web sites provided information on events on their Web sites while only 2 (10%) of the SADC organisations provided events information on their Web sites. Regional organisations largely provided announcements for workshops and conferences, i.e. ASARECA, AARINENA and CORAF. In addition, AARINENA also linked to the event pages of the Web sites of the FAO, CGIAR, ICARDA, ISNAR and GFAR. In the SADC region, under events, the Mauritius Sugar Industry Research Institute provided announcements for various activities including open days, workshops and seminars. Meanwhile the forthcoming events' page for the University of Natal – School of Agricultural Sciences and Agribusiness had not items at the time of the survey.

Journals and newsletters

Only one (4%) out of the 28 international organisations provided access to several titles (full-text copies) of its journals, and this was the FAO. Among the journals available on the FAO Web site include:

- *AGRIPPA*, a peer reviewed electronic journal for the electronic publishing of agricultural literature – reviews, scientific papers, short communications and extension materials
- *Food, Nutrition and Agriculture* covering topics such as community nutrition, food quality and safety, nutrition assessment, nutrient requirements, food security and rural development
- *Unasylva*, an international journal of forestry and forest industries, produced quarterly in separate English, French and Spanish editions.

Regarding providing access to newsletters, 25 (89%) international organisations made their newsletters available on their Web sites, mostly as PDF files. Among the newsletters provided are *Aquaculture Newsletter* and *FIVIMS Newsletter* by FAO; *CIFOR Newsletter*, *CABI-E-News*; *CIAT News-bulletin*, *Rice Today* by IRRI, *PGR Newsletter* by IPGRI, *IFET Newsletter*; *Seed Info Newsletter* by ICARDA; *ROCARIZ Newsletter* by WARDA and many others.

Although none of the regional agricultural organisations in Africa provided access to journals, there are at least some that are making their newsletters available on the Web. This was the case with 5 (72.5%) of the organisations surveyed. Newsletter titles provided included *AgriForum* by ASARECA, *AARINENA Newsletter*, *CORAF Action*, *Flash CILSS* and *AGRHYMET Info* by CILSS, and *LINKS* by NIDA.

Regarding SADC organisations only 1 (5%) provided access to its journal. This was GADI providing access to the *Grootfontein Agric Journal*. Access to newsletters was provided by 4 (20%) organisations and titles provided include: *Bio-e-News* by the CSIR; *PRAIS Outreach* by the Library and Information Services of the University of Orange Free State; *ICFR News*; and *GADI News*.

The negligible number of organisations providing access to full-text copies of journals could be attributed to the fact that generally journals require payment of subscription and therefore could not be provided freely on the Web sites. However, in the case of newsletters, these are generally distributed at not cost and no wonder a large number of the international organisations (89%) and regional organisations (62.5%) that were surveyed are taking advantage of the Web for distributing their newsletters. Regarding the SADC region, the reason for the low number of organisations providing access to newsletters could be that very few of them are actually publishing newsletters.

Discussion of the trends

The survey revealed a number of trends regarding the provision of access to digital information services and resources on Web sites of agriculture-

related organisations. The major findings are discussed below.

International organisations

The survey showed that international agricultural organisations are way ahead of agricultural research organisations in Africa, and the SADC region in particular in the use the Internet Web sites in providing access to information and knowledge resources they are generating in digital formats. Provision of access to different types of digital documents, i.e. corporate documents, technical documents and newsletters, updating visitors to the Web site with news and information regarding planned events and activities, is widespread among international agricultural organisations. The amount of information resources provided on most Web sites is huge and organisations are implementing various types of information discovery tools, such as search engines, site maps and taxonomies, on their sites to make it easy for end-users to retrieve information on their sites. Further, international organisations are taking advantage of the availability of other information resources on the Web and are providing links to related web resources held on other servers. These include links to external databases, technical documents, corporate documents, electronic newsletters, posters, tools and many more.

Important as they may be, provision of access to useful tools (32%), online staff directories (25%), discussion forums (25%), data sets (11%) and journals (1%) do not seem to be popular among international organisations. The reasons for this situation are wide and varied, and may include the following:

- Developing and maintaining software-based tools and models require resources such as staff, time and funding, and in addition this may not be a priority for many of the organisations. Others may have developed the tools meant for internal use only.
- Managing discussion forums sometimes require time and staff in order to sustain them.
- Data sets are expensive to collect and build and as a result organisations may not be willing to share their data sets.
- The staff strength in some organisations is too small to warrant an online staff directory. In some cases, organisations have implemented policies not to publish staff information on the Web.

Regional organisations in Africa

Although regional agricultural organisations in Africa (including those targeting Africa) are providing access to some digital information resources and services via their Web sites, in general the level and sophistication of the services is way below those of the international organisations. The survey revealed that the trend in most cases is to provide access to such documents as annual reports, strategic plans and minutes of meetings, than research reports, etc. This is understandable since most of the organisations are regional networks or forums and have members in various countries. However, these organisations should also use the Web to distribute documents such as technical reports, manuals and other types of documents being developed as a result of their research activities.

The survey also revealed that regional organisations are also making efforts to provide access to copies of their newsletters, although in some cases only old back issues, instead of the latest issues were available on the Web sites. This could be either due to the fact that the newsletters are no longer being published or the Web sites are not regularly updated. This was also the case with the provision of news and events information. Some organisations had very old information or news on their sites, basically due to the fact that they do not update their news pages on a regular basis. The amount of news information provided on the sites was also too little and makes one to wonder whether there is nothing worth reporting happening on in the organisations.

Unfortunately, none of the organisations provided access to tools, discussion forums, data sets and journals. While all the above are quite important, the absence of discussion forum facilities on the Web sites is a major concern. This is due to the fact that almost all-regional organisations have members located in different countries, and therefore discussion forum facilities could be one way of facilitating the sharing of information and knowledge among the their members.

SADC organisations

Compared to the trends set up by international organisations, the survey revealed that agricultu-

ral organisations in the SADC region are also quite behind in the provision of access to digital information resources and services. For example, while almost all international organisations provided access to key information sources and facilities, such as full-text documents, access to electronic databases, links to external information resources, and access to newsletters, on the average only 43% of the SADC organisations surveyed provided access to these facilities. There is a general need to improve the situation and encourage research organisations in the SADC region to adopt the use of the Internet and Web technologies in the provision of wider access to their information and knowledge products. This will integrate the information and knowledge they are generating into the global information infrastructure.

Conclusion

The findings of the survey revealed that international agricultural organisations are using their Web sites to provide access to online databases, electronic publications, tools and software, discussions forums, information retrieval tools, data sets, online staff directories and links to various Web resources. Although efforts are being made, organisations in Africa and the SADC region are generally behind in implementing innovative use of the Web. They may need to be guided in the development and provision of digital information services using the Internet and Web technologies. There is need to provide systematic guidelines that could be used in the development of agricultural information portals in Africa in general and the SADC region in particular.

Note

1. ISNAR closed its operations in The Hague on 31 March 2004, and a new ISNAR programme was relocated to Addis Ababa, Ethiopia, under the governance of the International Food Policy Research Institute (IFPRI). AROW and other ISNAR Web sites are archived at <http://www.isnar.cgiar.org/index1.htm> [viewed 13 July 2004].

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- Yahoo! 2001. Media relations: company profile. URL: <http://docs.yahoo.com/info/misc/overview.html> [viewed November 15, 2002]
- Appendix 1: Web sites of international agricultural organisations listed in AROW**
- Centre for International Forestry Research (CIFOR)
URL: <http://www.cifor.cgiar.org/>
- Centre for Agricultural and Biosciences International (CABI)
URL: <http://www.cabi.org/>
- International Maize and Wheat Improvement Centre (CIMMYT)
URL: <http://www.cimmyt.org/>
- Consultative Group on International Agricultural Research (CGIAR)
URL: <http://www.cgiar.org/>
- European Tropical Forest Research Network (ETFRN)
URL: <http://www.etfrn.org/etfrn/index.html>
- Food and Agricultural Organisation of the United Nations (FAO)
URL: <http://www.fao.org>
- Future Harvest (*the only Web site from the list that was not included in the survey.*)
URL: <http://www.futureharvest.org/>
- Global Forum on Agricultural Research (GFAR)
URL: <http://www.egfar.org/home.shtml>
- International Centre for Agricultural Research in the Dry Areas (ICARDA)
URL: <http://www.icarda.cgiar.org/>
- International Centre for Tropical Agriculture (CIAT)
URL: <http://www.ciat.cgiar.org/>
- International Crops Research Institute for Semi Arid Tropics (ICRISAT)
URL: <http://www.icrisat.org/>
- International Fertiliser Development Centre (IFDC)
URL: <http://www.ifdc.org/>
- International Food Policy Research Institute (IFPRI)
URL: <http://www.ifpri.cgiar.org/>
- International Fund for Agricultural Development (IFAD)
URL: <http://www.ifad.org/>
- International Institute of Fisheries Economics and Trade (IIFET)
URL: <http://www.orst.edu/Dept/IIFET/>
- International Institute of Tropical Agriculture (IITA)
URL: <http://www.iita.org/>
- International Livestock Research Institute (ILRI)
URL: <http://www.cgiar.org/ilri/>
- International Network for the Improvement of Banana and Plantain (INIBAP)
URL: <http://www.inibap.org/>
- International Potato Centre (CIP)
URL: <http://www.cipotato.org/>
- International Rice Research Institute (IRRI)
URL: <http://www.irri.org/>
- International Service for National Agricultural Research (ISNAR)
URL: <http://www.isnar.cgiar.org/>
- International Society of Sugar Cane Technologists (ISSCT)
URL: <http://www.sugaronline.com/issct>
- International Soil Reference and Information Centre (ISRIC)
URL: <http://www.isric.nl/>
- International Union of Forestry Research Organisations (IUFRO)
URL: <http://iufro.boku.ac.at/>
- International Water and Irrigation Management Institute (IIMI)
URL: <http://www.cgiar.org/iwmi/>
- The International Plant Genetic Resources Institute (IPGRI)
URL: <http://www.ipgri.cgiar.org/>
- West Africa Rice Development Association (WARDA)
URL: <http://www.warda.cgiar.org/>
- World Agroforestry Centre (formerly International Center for Research in Agroforestry (ICRAF)
URL: <http://www.worldagroforestrycentre.org/home.asp>
- World Fish Centre (formerly) Centre for Living Aquatic Resources Management (ICLARM)
URL: <http://www.worldfishcenter.org/>

Appendix 2: Web sites of agricultural organisations from the SADC region included in the survey

Botswana

Botswana College of Agriculture

URL: <http://www.bca.bw/index.html>

Department of Agricultural Research, Ministry of Agriculture

URL: <http://www.agricta.org/partners/dar/>

Mauritius

Food and Agriculture Research Council (FARC)

URL: <http://farc.gov.mu/>

Agricultural Research and Extension Unit (AREU)

URL: <http://ncb.intnet.mu/moa/areu/>

Mauritius Sugar Industry Research Institute (MSIRI)

URL: <http://webmsiri.intnet.mu/>

Mauritius Chamber of Agriculture (MChA)

URL: <http://www.prosi.net/directry/dirmca.htm>

Albion Fisheries Research Centre (AFRC)

URL: <http://ncb.intnet.mu/fish/afrc.htm>

Namibia

University of Namibia (UNAM) – Faculty of Agriculture and Natural Resources

URL: <http://www.unam.na/faculties/agriculture/index.html>

South Africa

Agricultural Research Council (ARC)

URL: <http://www.arc.agric.za/>

Food Science & Technology Programme, Division of Food Biological and Chemical Technologies (DFBCT) – Council for Scientific and Industrial Research (CSIR) URL:

<http://www.csir.co.za/biochemtek/index.html>

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Grootfontein Agricultural Development Institute

(GADI) URL: <http://gadi.agric.za/>

Institute for Commercial Forestry Research (ICFR)

URL: <http://www.icfrnet.unp.ac.za/>

University of Natal – School of Agricultural Sciences and Agribusiness

URL: <http://www.nu.ac.za/departement/default.asp?dept=asaunp>

University of the Free State – Faculty of Natural and Agricultural Sciences

URL: <http://www.uovs.ac.za/faculties/agrinat/>

National Department of Agriculture (NDA) – Agricultural Information Service (AGIS)

URL:

http://www.agis.agric.za/agisweb/IDceb6f2301f10e8/?Mival=agis_s.html

South African Sugar Association Experiment Station (SASA)

URL: <http://www.sasa.org.za/>

Tanzania

Department of R&D, Ministry of Agriculture and Food Security

URL: <http://www.drd.mafs.go.tz/>

University of Dar-es-Salaam – Institute of Marine Sciences

URL: <http://www.udsm.ac.tz/marine/super.html>

Tanzania Fisheries Research Institute (TAFIRI)

URL: <http://www.tanzaniafish.org/TAFIRI.htm>

Zambia

University of Zambia – School of Agricultural Sciences

URL: <http://www.unza.zm/agric/agric.html>

Zimbabwe

University of Zimbabwe – Faculty of Agriculture

URL: <http://www.uz.ac.zw/agriculture/>