

# AGRIS LEVEL II AND THE INFORMATION SERVICES OF SPECIALIZED INFORMATION ANALYSIS CENTERS: THE CASE OF SATCRIS AND ITS SDI SERVICES

*A center for sorghum and millet information serves the semi-arid tropics with a wide range of services.*

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**ABSTRACT:** The article describes the objectives of the Semi-Arid Tropical Crops Information Service (SATCRIS), a Specialized Information Analysis Center (SIAC) at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Database design methodology at SATCRIS is described. Services are discussed. The evolution of the SDI service of SATCRIS from a manual service to the present automated service is described in detail, and a brief analysis is presented of the nature of the SDI clientele and the contribution of two global databases, viz. AGRIS and CABI, to the SATCRIS SDI service. Global attention is drawn to SIACs such as SATCRIS to enable better funding and coordination so that the objectives envisaged in AGRIS Level II are achieved.

## THE AGRIS CONCEPT

AGRIS, the International Information System for the Agricultural Sciences and Technology, was set up by the Food and Agriculture Organization (FAO) of the United Nations to improve access to and expedite the exchange of agricultural information on the basis of multilateral cooperation

among participating countries and organizations. AGRIS also aims at improving national capabilities for handling and managing agricultural information in developing countries.

The Panel of Experts (East, 1971), in recommending the establishment of AGRIS, suggested that the system be organized at two levels. While AGRIS Level I was to provide a rapid current awareness service in all fields of FAO's responsibility, Level II was to be a network of specialized information centers, analysis centers, and databanks with in-depth responsibility for particular subject fields. Level II was conceptualized to avoid wasteful duplication in subject sub-disciplines. AGRIS Levels I and II were conceived as being complementary to each other.

AGRIS Level I became operational by the end of 1974, after six years of discussion, planning, and evaluation. It comprises national and/or regional input centers and a coordinating center at FAO. The inputs into AGRIS are references to current literature (conventional and non-conventional) within the scope of the system, duly cataloged, indexed, and title translated if necessary, in the carrier language—English. The outputs of the AGRIS system are:

- AGRINDEX—a monthly printed bibliography;
- AGRIS database on magnetic tape;
- AGRIS database available for on-line searching on vendor systems.

While Level I has been functioning quite effectively since 1975 and has contributed significantly to the development of national capabilities for the transfer and management of agricultural information particularly in developing countries, Level II has yet to take off. Despite studies by Schützack (1973) and Catharinet (1974), and the recommendations of the Panel of Experts (Sixth meeting, 4-5 October 1973) to establish Level II operation in veterinary science, tropical agriculture, forestry, etc., no progress has been made.

## THE DEVELOPMENT OF SPECIALIZED INFORMATION ACCESS CENTERS

In the intervening period, new developments have taken place. Specialized information analysis centers (SIACs) have been implemented at a number of national, regional, or international research institutes. These centers provide a variety of services and have a well-

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## **THE DEVELOPMENT OF SPECIALIZED INFORMATION ACCESS CENTERS**

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In the intervening period, new developments have taken place. Specialized information analysis centers (SIACs) have been implemented at a number of national, regional, or international research institutes. These centers provide a variety of services and have a well-

defined focus, often on a single crop (e.g., sorghum, millet, cassava), a single aspect of agricultural practice (e.g., intercropping), or a single resource (e.g., irrigation). Since SIACs are located in centers of research, the information collection, products, and services of SIACs have benefitted from the advice of and interaction with researchers. The availability of excellent research facilities, the presence of experienced and highly motivated researchers coupled with excellent information resources, and the capability to handle such resources has helped to build "centers of excellence" within designated subject fields.

The databases and information services of the Cassava Information Center of CIAT at Cali, Colombia, the Tropical Grain Legumes Information Center of IITA at Ibadan, Nigeria, the International Irrigation Information Center at Bet Dagan, Israel, the Coconut Information Center of Coconut Research Board at Lunuwila, Sri Lanka, the International Buffalo Information Center at Kasetsart University, Bangkok, Thailand, and the Semi-Arid Tropical Crops Information Service ((SATCRIS) (formerly, Sorghum and Millet Information Center (SMIC)) of ICRISAT at Patancheru, India, are examples of SIACs that have filled a real need in the developing world. SIACs have been able to build good rapport with potential end users. Their coverage in their specialized areas of interest has greater depth than that of global databases in agriculture.

Some SIACs have been functioning for over 10 years, and are offering the services that were envisaged in AGRIS Level II. In recent years many SIACs have successfully adopted new information technologies, improving their capabilities to handle information and to serve a large clientele efficiently. Many of them serve also as

AGRIS input centers. Such SIACs undoubtedly have the potential to be considered as nodal centers for AGRIS Level II.

However, many SIACs have been funded, fully or partially, as special projects, thanks to the dispensations of donors such as IDRC, CTA, etc. The commitment of funds to SIACs is generally made for one to three years at a time, and hence all planning in SIACs is necessarily of a short-term nature. Furthermore, since most SIACs have been established through the initiative of a single institute (e.g., an international agricultural research center, or IARC), they reflect the service priorities of the parent institution, and adopt norms, definitions, and service standards that may not necessarily be internationally acceptable. Also, there is some overlap in the provision of services since, in some cases, more than one SIAC attempts to reach a given target population of users.

There is a need for global attention to be given to SIACs so that better funding and coordination, with associated long-term planning may become possible. In this paper an attempt is made to describe the major objectives of SATCRIS, as a case study of a SIAC. Database design methodology at SATCRIS, and its SDI service are therefore discussed in detail.

### **THE SEMI-ARID TROPICAL CROPS INFORMATION SERVICE (SATCRIS)**

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SATCRIS has been set up as part of ICRISAT's Library and Documentation Services, and aims to provide wide and efficient access to information on the crops researched by ICRISAT— sorghum, pearl millet, chickpea, pigeonpea, and groundnut, and also on agroclimatology, soils, and

farming systems of the semi-arid tropics. SATCRIS, like its predecessor SMIC (Sorghum and Millets Information Center), is a special project and has been funded in part by the International Development Research Centre (IDRC), Canada, initially for a period of 3 years. The project funding expires in November 1989. Many SATCRIS activities are dependent on IDRC funding, e.g., acquisition of data in machine-readable form, the production of its specialist abstracts service, and its document delivery service.

Objectives of SATCRIS are as follows:

- Participate in global/international information networks and systems through collaborative action and the provision of input to such systems.
- Develop a database relevant to the cropping of sorghum, pearl millet, chickpea, pigeonpea, and groundnut.
- Provide a package of information services to carefully selected clientele throughout the semi-arid tropics.
- Strengthen information handling capabilities at the ICRISAT Sahelian Center (ISC) in Niamey, Niger.
- Sensitize users in Africa to SATCRIS resources, services, and capabilities through user-oriented workshops.
- Utilize modern methods of information handling to provide wide and efficient access to needed information.

#### **Database Development Methodology**

An important objective of SATCRIS is to create and maintain a comprehensive bibliographic database of information on the five crops mandated to ICRISAT, and to associated information (agroclimatology, farming systems, food and nutritional quality, etc.).

Database creation at SATCRIS is done using machine-readable subsets of two global databases—CABI and AGRIS. A comprehensive profile of interests was communicated to CABI in 1987 and an agreement to obtain a subset of the CABI database on magnetic tape became effective in March 1988. Similarly, the AGRIS Processing Unit in Vienna provides the AGRIS tape each month for use at SATCRIS. Since ICRISAT is an AGRIS input center, it is entitled to receive the AGRIS tape free of charge. AGRIS tapes have been received each month since January 1988.

The monthly AGRIS tape, consisting of about 10,000 records is subjected to a selection operation to identify those records that are of interest to SATCRIS. A computer program has been written to identify and extract a subset of the AGRIS tape in a form that can be loaded into the SATCRIS database. About 250 records are selected each month from the AGRIS tape.

The CABI database subset, on the other hand, contains only those items which match the profile of our interests, as already communicated to CABI. However, another computer program has been written to restructure the CABI records to the SATCRIS database structure. About 300 records from the CABI database are added to the database each month.

Local input includes books and other monographs added to the library at ICRISAT and notably ICRISAT's formal and semi-formal publications. Further, input of analytics, i.e., chapters of books or papers from conference proceedings, are added to the database. About 150 records are added locally each month.

The SATCRIS database resides on ICRISAT's VAX11/780 computer system and uses the BASIS software package. The

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conceptual design of the SATCRIS database ensures that it is possible to import data from the two databases, CABI and AGRIS, and also that such data are integrated with local input. Processing programs have been written to minimize manual editing effort required to integrate data from three different sources (AGRIS, CABI, and local input) into a single database.

A conscious decision was made to distinguish terms of the

*to Unesco and IDRC on library and information related matters.*

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CAB thesaurus from that of the AGROVOC thesaurus in the SATCRIS database. Two separate fields called Descriptors and Identifiers have been designated to hold CAB thesaurus terms and AGROVOC terms, respectively. Search strategies and user profiles need to recognize the availability of terms from the two terminologies. This does indeed put a burden on the information-specialist searchers and would probably be unacceptable in non-delegated,

end-user searching. In addition to the above, subject access has been provided by significant words from the titles and abstracts, and by group codes.

It is well known that there is overlap in coverage between the CABI and AGRIS databases and it is inevitable that several common records exist in the two databases. In importing data from the two databases into the SATCRIS database it is necessary to eliminate duplicate records. This has been done using the duplicate checking feature that is available in the BASIS software.

#### SATCRIS Information Services

SATCRIS provides the following information services and products to carefully selected clients throughout the semi-arid tropics:

- An automated SDI service.
- On-demand literature search service using the in-house database (SATCRIS database), the AGRICOLA database on CD-ROM, or external databases available online from vendor systems, e.g., DIALOG.
- Specialist abstracts service in collaboration with CAB International (CABI). Three abstracts services are being produced to cover all the five crops mandated to ICRISAT. These are provided free of cost to about 800 individuals and institutions all over the semi-arid tropics.
- Information analysis service. In this service SATCRIS collaborates with scientists to produce literature reviews, critical evaluations of the literature, and information consolidation products on specific topics.
- Document delivery service.

### SELECTIVE DISSEMINATION OF INFORMATION (SDI) SERVICE AT SATCRIS

The SDI service is considered to be the most useful of all the current awareness services since it permits outputs to be tailored to meet needs of individual specialists or the broad-based interests of small teams of researchers. This service also provides for regular feedback from users, analysis of which enables it to be fine-tuned to meet ongoing needs and interests. Furthermore, SDI, if based on inputs from more than one source database, provides a browsing approach to current information from a variety of document types from across disciplines.

#### The Evolution of SDI Service at ICRISAT

A manual SDI service was started in 1979. This service was based on the scanning of 500 current periodicals received in the library. Items selected were grouped into broad topical groups, e.g., sorghum agronomy, pigeonpea pathology, etc. Photocopies of the first two pages of selected articles, which usually contained author abstracts, were compiled in the form of a list of abstracts in broad subject areas and distributed to ICRISAT's scientists and others. Although this service was not strictly an SDI service, it served to alert users to recent literature in broad subject fields.

In 1984, the service was expanded to include items from selected secondary periodicals. Abstracts from such periodicals were added to those selected from primary periodicals to constitute the disseminated items.

In 1986, data entry, sorting of items by broad groups, and formatted output was accomplished using software developed locally.

This considerably enhanced the quality of the products. The service, however, was still based on manual grouping of items into the broad subject categories. The capability to select the items to be disseminated, based on carefully constructed user profiles that reflected well-defined individual interests, was still not present.

In the last quarter of 1986 the acquisition of a versatile data management package called BASIS, developed by Battelle Development Corporation, USA (1986), and the development of the SATCRIS database using the methodology described above, enabled the development of an automated SDI service. This service was mounted in 1988. The components of this service are discussed in detail in the following sections.

#### User Profiles

User profiles are an important component of any SDI service. The quality of SDI outputs depends on the care with which user profiles are prepared. As in other SDI service organizations, a form was designed and mailed to all recipients of the earlier SDI service and to scientists who were regular users of other ICRISAT services. The form enabled scientists to describe, in their own language, the subject of their interests, their present areas of work, the connotations of concepts important to them, and limitations, if any, that they would like to impose on their output. Further, the form attempted to find out whether the user required high recall or high precision in his outputs.

Many new scientists who came to know of this service through their colleagues also asked for and filled in the form. About 140 scientists from all over the world returned the filled-in form by February 1988, and service began in March 1988. The number of recipients has now in-

creased to 250 in one year. Two types of user profiles have been designed.

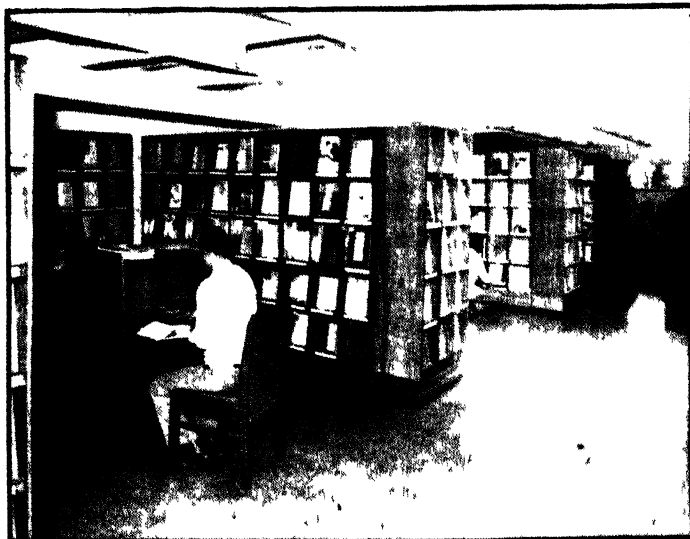
■ Standard profiles covering broad areas, e.g., sorghum entomology, groundnut breeding, etc. These profiles, also called macro-profiles, serve a small group/team of scientists whose areas of work are similar.

■ Special or individual profiles, tailored to meet specific requirements of individual scientists, e.g., effect of the drought stress on sorghum yield, or alcohol production from sweet sorghum.

Each user profile is a combination of search commands, and fields to be searched constituting the search strategy. CAB thesaurus, AGROVOC, and free-text terms have been used to describe search terms of a profile. Although provided for, the use of non-subject parameters, e.g., names of authors or institutions, have not been requested widely by SDI recipients. The PROFILE module of BASIS has been used for the creation, updating and storage of user profiles.

#### The SDI Menu

All stored user profiles can be executed either individually or collectively and interactively, or in batch mode. The PROFILE module of BASIS allows any number of user profiles to be built and/or modified. Furthermore, a given profile can call other profiles in much the same way that a computer program can call subprograms. In fact, a Master profile that calls and runs the other profiles one by one has been created. The first statement in this profile, specifies the range of dates of entry between which the database records should be selected. The set of input data entered between the range specified becomes the universe for all the user profiles to be executed in that particular month. Profile execution results in the re-



The ICRISAT Library maintains a large collection of current periodicals to serve researchers in the semi-arid tropics.



Young scientists spend time at ICRISAT doing collaborative research. They enjoy using library collections to keep up-to-date in their disciplines.

trieval of a final set for each user profile.

#### Output Generation

The final set is sorted using the SORT module of BASIS to arrange the records alphabetically by author's names and then formatted for output using the RE-

PORTS module of BASIS. This module enables the creation, storage, and execution of REPORT procedures for the production of formatted output products. Report procedures use programming language-like constructs to access database records, or records in a search set, data elements within a records, and for the formatting of

the output to print image files on disk.

The REPORTS module is used to accumulate all SDI outputs in a single output disk file. This is then printed offline using a laser printer to obtain high-quality output. Each record in the SDI output contains adequate bibliographic information to identify the record and includes an abstract (wherever available) and descriptors or identifiers.

### Feedback Mechanism

An important feature of the SDI service is a built-in feedback mechanism through which the response of each recipient to SDI

notifications is obtained. In our SDI, document delivery service has been tightly coupled to users' feedback. The SDI output is printed in two identical parts, viz., user copy part, and feedback copy part. The feedback copy part has two questions at the end of each record asking a user about the relevance of that record to his interests and work, and whether he wants a copy of it.

All SDI users are expected to return the feedback copy part to us with their comments. This feedback not only enables us to supply a copy of the desired documents, it also indicates changing needs and interests. Over 70% of the SDI recipients are sending feedback reg-

ularly with their comments and requests for photocopies.

SDI is a user-oriented service and we believe that user participation is essential in getting the best results. One possible reason for not getting feedback from 30% of the present set of recipients is that they do not find the service useful. An attempt is now being made to ascertain if this is the case and, if so, how it can be corrected. We believe that it is important to target the SDI service to that segment of the user community that is best capable of benefitting from the service.

Not all users require a service such as SDI to satisfy their current-awareness needs. For instance, senior research administrators and managers, whose area of operations spreads across several research programs and projects may not find SDI outputs useful, since they may not be in a position to precisely define their needs. And, even if this service were offered, the quantum of output they would receive would defeat one of the central purposes of SDI—to avoid information overload.

### Analysis of Feedback

Analysis of feedback is an ongoing exercise. If a user has requested copies of originals, immediate action is initiated to supply a copy of the documents requested. We provide free single copies of documents in the SATCRIS collection on demand. In addition, services of national and international libraries, depositories, and documentation or information centers, such as NAL, BLLD, and AGLINET libraries, are used to fulfill requests for originals of documents. The feedback is regularly analyzed to find the recall, precision, and usefulness of retrieved records for a particular user; the reasons for retrieval of irrelevant records, if any; and to

Table 1. Recipients of the SATCRIS SDI Service by continent and country

AFRICA: 87		ASIA: 174	
Benin	1	Bangladesh	1
Botswana	2	China	8
Burkina Faso	6	India	144
Cameroon	1	(ICRISAT 40)	
Cote d'Ivoire	1	(Other Instit. 104)	
Ethiopia	19	Indonesia	2
Kenya	14	Iraq	1
Mali	3	Japan	1
Niger	11	Nepal	3
Nigeria	6	PDR Yemen	2
Senegal	2	Pakistan	4
Somalia	9	Syria	2
Sudan	2	Thailand	1
Uganda	1	Turkey	3
Zambia	6	Vietnam	1
Zimbabwe	3		
AMERICAS: 11		EUROPE: 4	
Mexico	6	FR Germany	1
Nicaragua	1	Netherlands	1
Peru	1	UK	1
USA	3	Yugoslavia	1
<b>TOTAL: 276</b>			

modify profiles if necessary.

Users' feedback of profiles that consistently produce high recall or high precision is carefully analyzed to see if the profile is missing useful information, or if it can be tightened to reduce recall. Our experience, so far, shows that standard profiles produce high recall since such profiles cover all the aspects/topics of a fairly broad subject, e.g., sorghum agronomy. On the contrary, special or individual profiles produce high precision. Such profiles are modified periodically based upon the feedback received to achieve desired recall and precision performance.

Analysis of the responses received reveals that the percentage of records marked as relevant ranges between 50 and 100%. Outputs against individual profiles are found to produce between 75 and 100% relevant records, while those in standard profiles produce 50-75% relevant records. This is understandable, considering that a standard profile covers all aspects of a broad subject. After a few months, the feedback of scientists receiving standard profiles is analyzed to find out if a suitable individual or special profile can be designed for them.

profiles, 108 recipients (39% of all SDI recipients) get outputs based on one standard profile, and 27% of the recipients get outputs based on two or more standard profiles.

We believe that our SDI service has been well received by the present group of recipients in different countries of the semi-arid tropics. Table 1 gives the geographical distribution of SDI users, and shows that 63% of users (174) are from 13 countries of Asia and 31% (87) are from 16 countries of Africa. Eighty percent of African users and 60% of the Asian users have asked for standard profiles on one or more subjects/crops. We believe that only a small portion of the pertinent target group, particularly in Africa, has been tapped. The traveling workshops of SATCRIS in eastern and southern Africa, and other methods such as notices of the service in ICRISAT's newsletters, are being used to promote the service.

Table 2 shows that, of the 5019 records output in various SDI profiles during April to December 1988, CABI has contributed 49%, AGRIS 32%, and the local input for books, reports, analytics and other non-con-

ventional literature—conventional and non-conventional—in SDI outputs. However, variations in indexing practices of different databases can cause considerable noise in retrieval, and this to some extent could affect the quality of SDI outputs, particularly for those based on broad profiles, such as our standard profiles. This further emphasizes the need for care and greater interaction with users in profile development.

## THE FUTURE OF SATCRIS

SATCRIS has plans to move into new areas of information work, e.g., non-bibliographic databases relevant to its clientele, expert systems, and information consolidation. More importantly, SATCRIS is in a position to work in close collaboration with other IARCs and NARS in formalized network arrangements that will reinforce members capabilities to share resources and expertise and to improve capabilities of NARS to manage and deliver information. We believe that the future lies in the creation of formal regional information networks in

**Table 2. Contribution of CABI, AGRIS databases, and local input to SDI service outputs**

Month	Total no. of refs. output	Contribution of CABI		Contribution of AGRIS		Local input	
Apr 88	408	221	54.2%	104	25.5%	83	20.3%
Jun 88	866	418	48.3%	209	24.1%	239	27.6%
Jul 88	456	239	52.4%	212	46.5%	5	1.1%
Aug 88	701	237	33.8%	201	28.7%	263	37.5%
Sep 88	436	314	72.0%	24	5.5%	98	22.5%
Oct 88	536	294	55.0%	54	10.0%	188	35.0%
Nov 88	698	377	54.0%	271	39.0%	50	7.0%
Dec 88	918	358	39.0%	522	57.0%	38	4.0%
	5019	2458	49.0%	1597	32.0%	964	19.0%

At present 94 recipients (34% of all SDI recipients) receive outputs based on special/individual

tional literature contributed 19%.

Input from more than one source database enables wide cov-

which several SIACs collaborate with NARS libraries and documentation centers to improve ac-



tion. We believe that the future lies in the creation of formal regional information networks in which several SIACs collaborate with NARS libraries and documentation centers to improve accessibility to information and to multiply benefits, fulfilling the originally stated objectives of AGRIS Level II.

## CONCLUSION

SATCRIS, we believe, has filled a real need for information services provided to scientists working on ICRISAT's crops, particularly in the countries of Africa. SATCRIS has also conceptualized and validated a database design methodology that utilizes the products of global systems, viz., AGRIS and CABI together with local input, enabling the creation of a database that in time has the potential for being comprehensive insofar as the crops and associated interests of ICRISAT are concerned.

However, many of the present components of SATCRIS activities are dependent on special-

project funding, e.g., obtaining data in machine-readable form, and the document delivery service. The future of SATCRIS and other SIACs elsewhere seems to be in jeopardy because the funding available for agricultural research internationally is unpredictable and variable, and only a small share of it is normally allocated to information work.

Most SIACs, as already pointed out, have emerged from initiatives by a few institutions and/or a donor agency such as IDRC, and their funding is hence subject to decision-making about priorities common to all institutions and donors concerned with development work.

On the other hand, SIACs have proved their value not only to the institutions in which they have been established but also to users in many NARS. There is no doubt that existing SIACs have built up valuable resources, and have accumulated expertise and acquired experience, which, properly funding and coordinated, could well become AGRIS Level II.

Coordination includes the

formulation and acceptance of well thought out domains of interest for the centers concerned, service norms and standards, and governance mechanisms to ensure that goals are being met. International attention by FAO, UNDP, and The World Bank, and a feasibility study on how the SIACs can be tightly or loosely networked, what new SIACs need to be set up etc., are suggested as valuable further steps in achieving AGRIS Level II objectives.

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The Sorghum and Millets Database of SATCRIS is computerized. Access to worldwide databases is also easily available.