NEW HORIZONS
IN AGRICULTURAL
INFORMATION MANAGEMENT

PROCEEDINGS
OF AN INTERNATIONAL SYMPOSIUM
MARCH 13-16, 1991
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New Horizons in Agricultural Information Management

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Strengthening the Establishment of a Chinese Regional Monographic Agricultural Document Database

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Abstract
First, this paper discusses the local superiority of Chinese agricultural reference documents, cites some local agricultural publications and briefly analyzes the utilization of agricultural documentation resources and the existing situation of China's information science and technology. The authors hold that the establishment of a monographic agricultural document database not only meets the needs of our era but is also an effective strategy to exploit the local advantages of China's agricultural document resources as well. The paper puts more emphasis on a significant discussion of existing conditions, technical approaches, and developing a strategy for establishing a regional monographic database in China.

Nowadays, agriculture based on natural resources and traditional experience in China is changing into one with scientific knowledge and modern techniques as the base. The effects of science and technology in modern agricultural production is becoming more and more important. The 60-80% increase in agricultural production in the developed countries depends on the progress of technology. As the medium and carrier, the documents of agricultural science and technology are one of our special agricultural information resources. The exploitation and utilization of which have an important role to play in the course of modern agriculture. How to increase the exploitation and transmission of agricultural documents in science and technology is always a major task in the sectors of agricultural science and information technology.

1. The regional characteristics of China's agricultural documentary resources

As a special kind of agricultural resource, agricultural documents have a close relationship with agricultural production and scientific research, and in return, agro-production and agro-scientific research activities are the resources of agricultural documents and information. At the same time, agricultural documentation information reacts to agricultural production and agro-scientific research, guides it, and pushes it forward.

China is a large country with different natural conditions (including climate, topography, soils, organisms, etc.), different areas, and different economic environments. These differences result in the fact that agricultural production and agro-scientific
research have strong regional superiority, and also causes agro-science and technology documents to have a large regional distribution, thus forming different superior special documents resources in different regions.

Let's begin to examine the journals published in four main regions in China: the southern part of China is the region for tropical crop production. The journals Research on Crops, Research of Tropical Crops, Reference Materials of Tropical Crops, Science and Technology of Tropical Crops, Transactions of Tropical Crops, and Sugarcane and Sugar, etc., are published in this region. The eastern part of China is a major region of silkworm and tea production. The journals Science of Silkworm, Abstracts of Silkworm, Foreign Agriculture--Silkworm, Tea of China and Abstracts of Tea, etc., are published in this area. The northeastern part of China is a major region of soybean production where the journals Science of Soybean, Foreign Agriculture--Soybean and Abstracts of Soybean, etc., are published. Moreover, in the journals of general agriculture, the number of papers on soybean are obviously more prevalent than those on other subjects. The Northwestern part of China is the region of animal husbandry production. Among the 52 journals on animal husbandry and veterinary medicine published in China, eighteen are published in the northwestern region. Major arid agriculture production is also in the northwestern part of China. The journals Research on Agriculture in Arid Regions, Abstracts of Agriculture in Arid Regions, Journal of Geography in Arid Regions and Research of Arid Regions are published in this region. The regional distribution characteristics of the above agricultural documents are shown not only in the professional journals but also in the comprehensive agricultural publications, the proceedings of research papers and notes of seminars and even in agricultural books. For instance, the Shaanxi Journal of Agricultural Sciences has a special column for rainfed agricultural research. The comprehensive agricultural journals published in Yunnan and Guizhou provinces have a large number of papers on tobacco science and technology. The Rainfed Agricultural Research Laboratory of Shaanxi Province has contributed "The Selection of Rainfed Agricultural Information in Arid and Semiarid Areas in China," etc. This characteristic in China's agricultural science and technology information work can not be neglected.

2. Establishment of a regional monographic database of agricultural documents

With the development of the world database industry, the Chinese scientific and technological information cause is now in a period of transition from a traditional mode to a modern mode of database development. Construction of a database on agricultural documents is in its beginning stage. There are seven special databases being constructed, and another four databases are planned to be set up on a small scale, dispersed, and in a specific subject specialty with obvious regional characteristics. The Database of Sesame Documents set up in the Academy of Agricultural Sciences of Hebei Province, the Database of Scientific and Technological Documents on Tropical or Sub-tropical Fruits set up in Guangxi Agricultural college, etc., are examples in this field. The establishment of a database of agricultural documents not only meets the needs of our times, fits the developmental trend of scientific and technological infor-
mation, but is also an effective strategy for agro-document resource exploitation and utilization.

The regional features in agricultural production determine the forms of agricultural documents. In return, the demand for agricultural documents by agricultural production and scientific research also have regional features. Statistics on the utilization of publications in our library shows that the number of consultations of the *Shaanxi Journal of Agricultural Science* by scientific research personnel and the utilization ratio are significantly higher than the numbers for journals in other regions. This shows that regional publications have a high value of utilization with strong local characteristics. Based on the dispersed characteristics of agricultural document resources and taking advantage of different professional document resources and different demands for different professional documents in different regions, we can establish a monographic database for agricultural documents and information in dispersed distribution arrangements. It will not only reflect the level and development of agro-science research of the region, adapt to the needs of document information for different special research, but also can develop the regional document resources, and provide an effective agricultural information service for the region.

2.1. At present, some basic conditions for the regional agricultural document database establishment have changed greatly with the start of the monographic database establishment.

2.1.1. China's agricultural information system has been formed after ten years' efforts. It consists of the national center, the seven regional subcentres, thirty agricultural institutes distributed in more than thirty provinces, municipalities, autonomous regions, seventy agricultural colleges and universities and more than forty national professional research organizations, libraries and information sectors. Agro-science information units in different districts have cooperative organizations with different forms, doing an effective job in coordinating the distribution of documents to achieve the sharing of resources, developing information research, exchanging experiences, etc., thus laying an organizational basis for the establishment of the regional monographic database.

2.1.2. There are a large number of comprehensive, special publications and retrieval journals which report agricultural information both at home and abroad.

2.1.3. Some units affiliated with the central agricultural libraries and information centres, agricultural colleges and universities have been equipped with microcomputers or minicomputers. The seven regional subcentres have also been equipped with IBM PS/2-50 microcomputers.

The basic hardware conditions are ready for the establishment of regional monographic databases.

2.1.4. The Chinese character processing techniques are being perfected. A lot of national standards on information processing and document publishing, such as the
Format for Documentation Bibliographic Information Interchange on Magnetic Tape (GB2901-82), Document Subject Title Rules (GB3860-83), and Retrieval Journal Catalogue Rules (GB3973-83) have been published, thus laying a solid foundation for the standardization of computer processing of agricultural documentation and information.

2.1.5. The establishment of the National AGRIS Centre and seven regional AGRIS subcentres laid the foundation for the regional monographic database establishment, and provided database creation experience. The authors are members of the northwestern AGRIS subcentre and took part in the construction of the Comprehensive Database of Chinese Agricultural Documentation Bibliographies, and were involved in the work of collecting, analyzing and processing documents. We find, among fifty different journals in agriculture, sixteen are journals on animal husbandry and veterinary medicine. Among the 1,000 records inputted in the database in the first half of 1989, 540 were on animal husbandry and veterinary medicine. According to the Compilation of Names of Scientific Research Institutes and Institutes of Developing Techniques in China, there are 129 institutes of research on animal husbandry and veterinary medicine in China, and 28 of them are in northwestern China. The number of institutes in northwest China is eleven more than the average number for the other six regions.

This figure shows that the large number of documents on animal husbandry and veterinary medicine is a majority of the agricultural documents in northwest China. These kinds of documents are the local areas of necessity for documents and of information services in northwest China. In fact, there is a local characteristic to documents input in the other subcenters, such as aquatic product documents in central China; documents on wheat, barley, triticale, etc., in north China; basic subject research documents in east China, etc. We feel that when the AGRIS centre and subcentres in China established the national comprehensive database of documents, they laid the foundation for constructing regional databases of documents.

2.2. On developing a strategy for a regional monographic document database.

2.2.1. To strengthen integrated programs, make sure to coordinate their development. For problems existing during the early development of the monographic database, it is necessary to bring the superiority of macroscopic control at the national level into full play with the further development of the monographic database, with overall planning for the structure of the system, its distribution, the range of subjects, and to ensure a rational design, concentrated aim, and better applicability.

The electronic computer retrieval system should be expandable to become an agricultural information system for the whole country, including farming, animal husbandry and fisheries. Coordination with retrieval publications systems, agricultural science organizations, and agricultural colleges and universities, should be ensured.
2.2.2. A proper dispersed treatment and cooperative establishment of the database must be practiced. The collection of documents is an important step in setting up the database, and it is a major source for data to input. So the scope of collecting documents should be extensive and cover all subjects. As prices of journals and books rise in China, the quantities of documents acquired becomes smaller and smaller. But the advantage of socialism makes strengthening of cooperation easier, so that we can establish the monographic database mainly by using documents in our own collections, we can also consider the method of shred collection development in accordance with provinces' strengths and specialties. First, every academy, college (or university), and professional institute throughout China should take up the collecting, and pre-processing of data for different professional documents. And then, each of the seven AGRIS subcentres should serve as an authorized regional centre of professional document retrieval, and undertake the establishment of the monographic database, including inputting data and document retrieval. Finally, this system of document collection and processing of professional agricultural data should conform to that in the seven AGRIS subcentres. If the system combines with the national comprehensive database and becomes a subsystem of the national database, this will increase the speed of establishing the database, enlarge the amount of data, improve the applicability, and will also give full rein to the superiority of each locality, and reduce investment costs.

2.3. Technical tactics on the establishment of the regional monographic document database.

2.3.1. On the computer system. There is no doubt that establishing databases using microcomputers is a suitable technical approach in China and other developing countries, because of its small investment and low environmental requirements. Thus, as far as the establishment of a regional monographic document database is concerned, microcomputers are very suitable for small-sized databases and dispersed data processing. At present, there is a kind of super microcomputer with 620Mb hard disk and 4Mb RAM, whose price is only 1/5 to 1/3 that of a minicomputer. Furthermore, a microcomputer has the advantages of ample software, a short period for software development, and being easy to operate, etc. Thus, no priority is given to the selection of a minicomputer during the establishment of the regional monographic database, but attention must be paid to enhanced functions, and consideration should also be given to the performance of a main computer which can be used as a file server.

For computer storage systems, the capacity of a floppy disk is obviously too small, but its utilization for data collection and interchange is effective at present. A harddisk is too expensive and is not easily transportable. CD-ROMs are mainly used for foreign database retrieval at this early time. The magneto-optic (MO) disk is the ideal selection for information retrieval, but, it will take a period of time before it is used widely in China. There is also a kind of "removeable harddisk," which can be used like a floppy disk, whose capacity is 20Mb, and with a search speed approaching that of a harddisk. This "removeable harddisk" is very suitable for the establishment of regional databases. It may be considered for use in database storage and retrieval, and in the national database storage and annual data exchange. But close attention should be paid to MO disks; once the conditions are ripe, the MO disk must be used as early as possible.
2.3.2. Data collection and interchange. The establishment of a computer network should not be considered at least for 3-5 years, because of restrictive conditions and low utilization. The data collection and data exchange activities may also use floppy disks.

2.3.3. The regional databases must be standardized in three aspects; that is to standardize the database structure, the data interchange tapes, and the language of retrieval, because of considerations for convenient cooperation, compatibility, transformation between systems, maintaining unanimity, improvement of the quality of the database and the effect of service. First, CDS/ISIS (the version which can process Chinese characters) should be considered. This is good microcomputer-based information retrieval software. The data interchange standard is ISO 2709 which allows exchange of data between small and large computers. As for the language of retrieval, the Agricultural Descriptor Language edited by the Chinese Academy of Agricultural Sciences should be considered. The National AGRIS Centre and the seven subcentres have done a good job in starting the establishment of the Comprehensive Database of Chinese Agricultural Documents, and their experience can be used for reference.

2.3.4. To augment the equipment in the regional AGRIS subcentres with computers for data input and facsimile capabilities added, will make the regional AGRIS subcentres become the core of the regional monographic database establishment.

The storage capacity of the PS/2-50 microcomputer provided for every regional AGRIS subcentre is too small (the harddisk is only 20Mb). The early edition of the CCS Chinese Character Processing System for the PS/2 is not fit to do the large quantities of tapes of Chinese characters. It is suggested that the harddisk and control card be changed to raise the capacity to 60Mb, with an external 5.25 inch floppydisk drive for easy data exchange with XTs, ATs or the same model in order to fit the necessary and gradual increase in data input.

3. The tentative plan and preparation for the establishment of the animal husbandry and veterinary scientific document database.

As we described before, northwest China is the main area for animal husbandry, and the information services emphasize the literature of animal husbandry and veterinary science, and have an obvious superiority in animal husbandry and veterinary science document resources. Because of these characteristics, we are prepared to establish the Animal Husbandry and Veterinary Science Document Database with the characteristics of northwest China, simultaneously with the establishment of the national comprehensive agricultural document database. At present, we have done some preparatory work. First, we have investigated the resources of animal husbandry and veterinary science in our country, we have strengthened the collection of related documents, and paid attention to the quality of the information indices. Then we separated the sub-database of animal husbandry and veterinary science from the comprehensive database. So far we have accumulated about 4,000 records. We plan to go further and get funding for the establishment of the database from various sources.
We wish to get help from the national centre, as well as assistance from related sectors. Although we are facing lots of difficulties, our aims will finally be attained when we establish the agricultural database, in order to exploit local agricultural document resources, raise the utilization efficiency of documentation, develop agricultural production, and promote agricultural scientific research.

As far as the Chinese agricultural information sectors at present are concerned, the establishment of the Chinese Agricultural Documentation Comprehensive Database is the main task of China's agricultural retrieval system, but the development of a distributed, small-size, standardized monographic database with regional features according to the regional characteristics of China's agricultural scientific research, production, and document distribution can form a "distributed database" by using the superior computer retrieval capability of the seven subcentres. If suitable exchange methods are adopted, the whole system will have a lot of the merits of a distributed database. It can be expected that with a high utilization ratio, better economic and social benefits will be obtained. If the monographic database establishes synchronized intersects with new information techniques including video-audio information, micrographics, facsimile, computer typesetting, laser printing, etc., the level of new information techniques can be improved quickly. Just as we have found that after computer typesetting and laser printing systems have been installed, the speed of agricultural document typesetting and printing has been greatly accelerated, also better economic returns and social benefits have been obtained, thus creating better conditions for the publishing of retrieval publications and starting a new field of research on the establishment of new integrated information techniques.