Hunt Institute for Botanical Documentation
5th Floor, Hunt Library
Carnegie Mellon University
4909 Frew Street
Pittsburgh, PA 15213-3890
Telephone: 412-268-2434
Email: huntinst@andrew.cmu.edu
Web site: www.huntbotanical.org

The Hunt Institute is committed to making its collections accessible for research. We are pleased to offer this digitized item.

Usage guidelines
We have provided this low-resolution, digitized version for research purposes. To inquire about publishing any images from this item, please contact the Institute.

Statement on harmful and offensive content
The Hunt Institute Archives contains hundreds of thousands of pages of historical content, writing and images, created by thousands of individuals connected to the botanical sciences. Due to the wide range of time and social context in which these materials were created, some of the collections contain material that reflect outdated, biased, offensive and possibly violent views, opinions and actions. The Hunt Institute for Botanical Documentation does not endorse the views expressed in these materials, which are inconsistent with our dedication to creating an inclusive, accessible and anti-discriminatory research environment. Archival records are historical documents, and the Hunt Institute keeps such records unaltered to maintain their integrity and to foster accountability for the actions and views of the collections' creators.

Many of the historical collections in the Hunt Institute Archives contain personal correspondence, notes, recollections and opinions, which may contain language, ideas or stereotypes that are offensive or harmful to others. These collections are maintained as records of the individuals involved and do not reflect the views or values of the Hunt Institute for Botanical Documentation or those of Carnegie Mellon University.

About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

	FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS	
	ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE	AGP:CGR/73/40 March 1973
	ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION	

FAO TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES

(In cooperation with the International Biological Programme of the International Council of Scientific Unions)

Rome, 12-16 March 1973

TIMETABLE

		Time
Monday, 12 March		
	Registration in FAO Building "A"	8.30-9.30
	PROCEDURAL MATTERS	
1.	Opening of the Conference by Mr. A.H. Boerma, Director-General, FAO	9.30
2.	Election of Chairman	
3.	Adoption of Agenda	
4.	Designation of drafting committee	
	SCIENTIFIC TOPICS	
Agenda item 5.	Surveys of Genetic Resources (Convenor: O.H. Frankel)	
	- Survey of crop genetic resources in their centres of diversity - O.H. Frankel (AGP:CGR/73/7)	
	- Present situation of wheat genetic resources in Syria, Iraq, Iran, Afghanistan and Pakistan - H. Kuckuck (AGP:CGR/73/39)	
	- The African survey - J.R. Harlan	
Agenda item 10.	Genetic Resources Centres (Convenor: O.H. Frankel)	14.30
	- Genetic resources centres - Functions, responsibilities and international cooperation - O.H. Frankel (AGP:CGR/73/21)	
	- A regional plan for germplasm collection, conservation and evaluation - E. Kjellqvist (AGP:CGR/73/20)	

WM/D6663

- IRRI's role as a genetic resources centre
  T.T. Chang (AGP:CGR/73/12)

- A global network of genetic resources centres - an urgent need for sustaining agricultural advance
  M.S. Swaminathan (AGP:CGR/73/38)

- Genetic resources centre for Ethiopia - M. Mengesha

- Germplasm conservation of wheat and maize - K. Finlay

Tuesday, 13 March

Agenda item 6. Distribution and organization of genetic variation in plant population (Convenor: D.R. Marshall) 9.00

- Optimum sampling strategies in genetic conservation
  D.R. Marshall and A.H.D. Brown (AGP:CGR/73/29)

- Population structure and the effects of breeding system - S.K. Jain (AGP:CGR/73/19)

- Population structure and the effects of isolation and selection - A.D. Bradshaw (AGP:CGR/73/15)

- Distribution of disease resistance in Ethiopian barleys - C.O. Qualset (AGP:CGR/73/30)

Agenda item 7.1 Practical problems in exploration (Convenor: J.R. Harlan) 14.30

- Introduction - Erna Bennett

- Practical problems in exploration - seed crops
  J.R. Harlan (AGP:CGR/73/35)

- Practical problems in exploration - vegetatively propagated crops - J.G. Hawkes (AGP:CGR/73/6)

- Practical problems in exploration - tree crops
  J.T. Sykes (AGP:CGR/73/37)

Wednesday, 14 March

Agenda item 7.2 Recent and proposed exploration missions (Convenor: J. León) 9.00

- Reading University plant collecting expeditions to north-eastern Brazil - Barbara Pickersgill (AGP:CGR/73/3)

- Recent and proposed exploration missions in West Africa - L.K. Opeke (AGP:CGR/73/28)

- Recent and proposed exploration missions in the USSR - D. Brezhnev (AGP:CGR/73/2)

- Report from Germplasm Resources Laboratory, USDA
  H. Hyland

- Recent and proposed exploration activities of the
  Izmir Centre - H. Ayla Sencer (AGP:CGR/73/17)

- Recent survey and exploration in rice - T.T. Chang
  (AGP:CGR/73/18)

- Exploration of genecentres of groundnuts (Arachis
  hypogaea L.) - A. Krapovickas (AGP:CGR/73/5)

- Exploration in Indonesia - Setijati Sastrapradja

- Plant exploration and collection by Canada -
  R. Loiselle (AGP:CGR/73/36)

- Exploration of potatoes in Chile, Bolivia and Peru
  C. Ochoa (AGP:CGR/73/34)

- Recent exploration in cacao - J. Soria

Agenda
item 8. Evaluation (Convenor: D. Bommer) 14.30

- The search for disease and insect resistance in
  rice germplasm - T.T. Chang (AGP:CGR/73/11)

- Evaluation for disease resistance - A. Dinoor

- Screening for cold and drought resistance in cereal
  breeding - V. Dorofeev

- The identification of high-quality protein variants
  and their use in crop plant improvement - D.E.
  Alexander (AGP:CGR/73/31)

- Screening for oil and fat quality in plants -
  G. Röbbelen (AGP:CGR/73/32)

- Secondary metabolites and crop plants - R. Hegnauer
  (AGP:CGR/73/33)

Thursday, 15 March

Agenda
item 9. Conservation (Convenor: J.G. Hawkes) 9.00

- Problems of long-term storage of seed - E.H. Roberts
  (AGP:CGR/73/4)

- Genetic maintenance in stored imbibed seeds
  T. Villiers (AGP:CGR/73/16)

- Long-term storage of meristem cultures for gene
  banks - G. Morel (AGP:CGR/73/25)

- The problem of genetic stability in plant cell and
  tissue cultures - F. D'Amato (AGP:CGR/73/24)

- Technical aspects of tissue culture storage for genetic conservation - G.G. Henshaw (AGP:CGR/73/22)

- Principal methods for maintaining viability of plant materials in liquid nitrogen - A. Sakai (AGP:CGR/73/13)

- The role of protective substances and subcellular structures in preserving frozen plants - T.I. Trunova, O.A. Krasavtsev and G.I. Tutkevich (AGP:CGR/73/23)

- Root culture as related to vegetative conservation N.V. Obroucheva

- Possible long-term cold storage of woody plant material - B. Howard (AGP:CGR/73/8)

- The storage of germplasm in the vegetative form of tropical roots and tubers - F.W. Martin (AGP:CGR/73/14)

- Genetic principles of conservation in reserves and national parks - R.F. Dasman

Friday, 16 March

Agenda item 11. Documentation (Convenor: D.J. Rogers) 9.00

- Requirements of information management systems for genetic resources centres - D.J. Rogers (AGP:CGR/73/9)

9:~~00~~ 9:25 - Genetic resources centre documentation: delimitation of the problems - B. Snoad (AGP:CGR/73/26)

9:40 - 10:05 Break - Descriptors and thesauri for world GRC documentation L. Seidewitz (AGP:CGR/73/27)

11:00 - 11:30 - The genetic resources centre: information as a critical dimension - a cost/effectiveness analysis of a system TAXIR on GRC information problems - G.N. Hersh and D.J. Rogers (AGP:CGR/73/10)

11:45 - Documentation of genetic resources - types of information, uses and international cooperation C.F. Konzak

CONCLUDING MATTERS

Agenda item 12. Adoption of recommendations 14.30

Change of order of speakers

For introductory comments

1. We are all "documentation experts", for we all keep records of 1 sort or another.
2. For some, a very limited set of records suffice -
3. " others, a very complex " " " are necessary.
4. In our context, we must ~~consider~~ consider both of these two requirements.
5. When working between 2 individuals, we can usually work out some compromise - but when we consider a very large no. of individuals, we need a very good system to accomplish the tasks.

There are several factors which derive from the above comments.

1. Need for some minimum standards to assure that at least some minimum of data are communicated.
2. There are individual requirements, however, which defy standardization, and we need to supply capability of a flexible, modifiable, technique to guarantee the maintenance of these non-standardizable types of documentation requirements.
3. Since all our endeavors generate data, or information, we must very carefully arrange systems of documentation which serve needs of all the various functions of a network of world-wide genetic resource centers.
4. The complexity of data obviously need efficient computing systems.
5. But computing systems alone do not provide the necessary and sufficient conditions - we must have the very best integration of systems.
6. Costs of documentation further demand very careful planning -

We hope to speak to each of these factors

FAO Technical Conference on Crop Genetic Resources (in co-operation with IBP), March 1973.

Mr. Rogers.

P.O. Box 1600,
CANBERRA CITY, A.C.T., 2601,
AUSTRALIA.

Please give or send your manuscript to ~~O.H. Frankel~~ J.G. Hawkes

January 15, 1973.

You may have been informed by the convener of the section in which you have kindly agreed to speak that many of the contributions to the conference are to be included in a book which is to be one of the "synthesis volumes" to be published for the International Biological Programme (IBP) by the Cambridge University Press.

In the context of this series the publication of this volume is to be the concluding effort in a series of activities throughout the 10 years of the IBP. In the area of plant gene pools, the role of IBP has been to collaborate with FAO in the clarification of scientific and methodological issues, the definition of goals and strategies, the preparation of guidelines for national and international participation, the planning and initiation of action programmes, and the dissemination of information at scientific, national and U.N. levels. Participation in the organization of the Technical Conferences in 1967 and 1972, in the Survey of Genetic Resources in the Field (1971/72), in the U.N. Conference on the Human Environment, and the publication of IBP Handbook No. 11 (Genetic Resources in Plants - their Exploration and Conservation) were some of these activities.

Most of the papers to be presented at the conference fall into one or another of the areas of IBP participation. They will indicate the progress which has been made in these 10 years, hence their inclusion in a synthesis volume will be appropriate. Others will be factual reports some of which may lend themselves to presentation as a group, or in the form of extended summaries. As editors we shall be responsible not only for the suitability of contributions in the context of the series, but for the overall length which is restricted to 300 pages by agreement between IBP and the publishers. It may be necessary to modify, reduce or reject some contributions, while giving extended space to scientific fields which had received insufficient attention in Handbook No. 11, and to issues of special practical significance. Population problems, conservation methods, and documentation clearly qualify on both these scores. In some instances we may have to look for additional material if this seems to be necessary in the interests of providing a full coverage of the subject.

Section conveners have no doubt mentioned to you that a full text of your paper is needed by mid-January. Should you find that, in the light of what has taken place at the conference, you need to modify the text of your contribution, we shall be pleased to receive an amended version subsequently. However, I am sure you will understand that for reasons of speed of publication we must impose a 'deadline'. Therefore, we shall not be able to include for publication any material received later than May 1st, 1973.

Authors will, of course, be consulted should any major changes be proposed by the editors, and they will receive the first set of proofs for corrections of errors by the printers. One copy of the book and 50 reprints will be issued free to authors.

We should like to take this opportunity of thanking you for your very kind collaboration in what we hope will be a publication of considerable interest and importance in the field of genetic resources.

Yours sincerely,

O.H. Frankel J.G. Hawkes

DOCUMENTATION OF GENETIC RESOURCES - TYPES OF INFORMATION, USES AND INTERNATIONAL COOPERATION[1]

by

C. F. Konzak[2]

---

[1]Scientific Papar No._____. College of Agriculture Research Center, Washington State University, Pullman. Project 1980.

[2]Professor of Agronomy and Genetics, Washington State University, Pullman, Washington 99163.

DOCUMENTATION OF GENETIC RESOURCES - TYPES OF INFORMATION, USES AND INTERNATIONAL COOPERATION

INTRODUCTION

The documentation of genetic resources accessions may include any and all information of value for an established or potential function in programs charged with the collection, management, conservation, evaluation, dissemination and practical use of these accessions. The many functions, and the extreme diversity of plant species involved in the various programs each may require deployment of certain specific operational procedures, and data management systems. However, there are some general concepts and operational approaches that should find wide application.

Some common approaches are already applicable to the structure composition and organization of data banks: 1) The documentation of genetic materials should include similar general and specific types of information irrespective of the species, methods of conservation, origin or end use. 2) The documentation should be divided (whenever feasible) into functional units, to be joined as necessary, but to achieve efficiency, possibly employing different information retrieval (IR) systems.

Among the general concepts with more futuristic objectives are the development of 1) international cooperation and coordination in the

construction of data banks and in the deployment and testing of computerized information systems, 2) internationally standardized methods of crop research data recording and 3) internationally coordinated mechanisms for expert evaluation and processing of performance, disease reaction and other subjective data prior to their entry in data banks at genetic resource centres (GRC).

Common Approaches Applicable to Current Problems

1. General and Specific Documentation - Required documentation on all genetic resource materials includes first unique identification. At first impression this would not seem to be such a difficult problem. However, of the apparently large number of accessions of genetic resources known to be maintained in the world today, a rather high but as yet unknown proportion certainly have a common origin. Stocks have been transferred from one genetic resource centre to another (including plant breeding and other programs) and assigned new identification. In many cases it should be possible to eventually trace these duplications, but it is an unnecessary and confusing situation. To some extent, known duplicate maintenance of all stocks is desirable to prevent against accidental loss, and known valuable stocks should be readily available to all users. However, the original identification could be and should be maintained, if its uniqueness was assured by international agreement and coordination. The requirements are simple and steps already have been taken through the initiative of the FAO-IAEA Working Group on International Standardization in Crop Research Data Recording to assist genetic resource centres in the selection of unique alphabetic code symbols for their accession series. With major programs as for example, the USDA plant inventory system, there would be need only to

signify the original unique and permanent identification in bold type, quotes or italics. Similar systems of accession identification are applicable everywhere and would be a prime factor in efforts to avoid duplicate numbering, so long as the stock was assigned a confirming accession number. Each genetic resource stock should have a unique accession number, name or designation, as well as selection data where appropriate. An eight space identification number, the first 2 or 3 of which carry the unique alphabetic codes is already widely used. The third symbol often identifies different subcentres within a country or major program. Taxonomic identification already is nearly standard on a world-wide basis. However, active data banks carrying frequently used information find the use of a few simple crop identification codes to be economical. This practice can provide a saving, but should not be carried to extremes. A complete or uniquely abbreviated epitaph should be recorded at least in the origin records.

Because we are giving special attention here to collections from plant explorations, and because the range of genetic variability carried by these collections will seldom be fully known, some special means of identifying these materials is needed. A simple alphabetic code or number could be used, or the term COLL and perhaps the collection number might be included along with any complete or abbreviated local or name or designation.

At first this problem may seem a triviality, but we assure you it is not. When for convenience, the genetic resource centres use only a limited number of unique accession series as identification, all accessions usually are processed by the same techniques be they collections from explorations, or at the other extreme, improved cultivars. Likewise,

sampling of the sometimes highly variable collected accessions is much more of a problem than it is for selected materials. Uniquely identifying the kind of origin of accessions can help to limit their erosion during conservation practice.

Crop specific identification, especially for a few discrete characteristics is important as an aid to the identity even at an early stage of conservation. Recording of these simple data should be the responsibility of the originating GRC. More extensive description and evaluation records will be needed for most materials and when available the most useful data should be included in the fast retrieval files. This type of information could be rapidly and widely shared. Currently a number of GRC's are preparing machine readable records of data now accessible. It is evident already that the data are in a variety of forms (See also Snoad). At some future point it will be essential to standardize but in most cases the data should be useful for research and transformations can be automated.

It is important that a concerted effort be made to compile all comparable data available on collected materials since these data can illustrate the gaps and weaknesses in existing collections, and focus the attention of explorers on means of filling the gaps and correcting the weaknesses. From preliminary analyses on only a small portion of the USDA World Collections of wheats and barleys some important features of their geographical origin have been identified (1). These results and those of Qualset (13,14) should prove useful in planning future explorations.

The Structure of Data Banks - Functional Units

Tremendous progress in the compilation and study of machine readable

data has been made during even the past year by a number of the existing genetic resource centres. However, most have yet had only a little experience with relatively few data on few crop species (2,3,12). Much more development and testing of systems for managing the different kinds of data are needed before attempts to standardize record structures of data banks should be considered. For the moment, flexibility in record structures of the main data banks would seem to be a wise choice. At a later time some record structures might be unified on a crop basis taking advantage of experiences gained and improvements in techniques. However, there may almost always be some differences in the size and composition of records at the different GRC's due to computer limitations. There is, nevertheless, a trend toward developing functional unit data banks instead of including all data on all accessions in a single large bank. The importance and variability of crop specific data already makes subdivisions mandatory on a crop by crop basis for the main data banks which should carry the information most frequently used in an efficiently retrievable form. But this need not be true for all data banks, particularly those storing information from the collection records. In these data banks, the complete information from the Plant Exploration data bank collection records might be maintained even possibly in collection number order until the number of collections of a given crop species is such that it is economical to separate them into different units. The relatively uniform composition of collection records will make this possible. Since all the data from collection records may not need to be selectively retrievable or even used as frequently as that on the description of collected

materials and evaluations, a type of abstract or reference retrieval system may best manage collection record data. In fact, only a few parts of the information from the proposed standard collection records seem to have frequent use. These are the map coordinates for the geographical site of origin, the cultivar or common name and any descriptive information. The taxonomic identity recorded on the collection record most likely will be reduced by coding when the information is transferred to most crop specific data banks. The balance of the information on collection records normally will be of most interest to the collector and the exploration centre or agency, but should be available whenever needed or requested by another GRC. When sufficient number of collection records are available, research might be conducted to extract any meaningful information, or to continuously update information on the distribution of specific crop collections on survey maps. In addition, the data bank(s) of collection records will be used in the process of generating parts of other data banks, particularly those concerned with "housekeeping" and other management operations.

Special data banks - (1) Beyond the plant exploration stage, it may happen that data banks of information on advanced cultivars will have a far different structure than those on materials used in plant breeding and other research. These smaller data banks may be handled as different functional units, since their purpose may be related primarily to variety protection activities.

Also, it appears now that to achieve maximal efficiency with an IR system such as TAXIR, such information as pedigrees, or perhaps cultivar names may need to be stored in separate units, searched

either before or after the description and evaluation records, depending on the nature of the request.

Detailed data - (2) Several other kinds of data such as detailed disease reactions recorded for many locations and years, etc., will usually be maintained in separate functional units, used only on infrequent occasions or for special research.

Housekeeping records - (3) As indicated above, each GRC may need several types of "housekeeping" files. Information on the storage location information, and the number of available units (as 5 grams or smaller samples of seed) of an accession might be kept in the main active data bank at a GRC, along with coded information on other sources of the same accession at GRC's. Also, it will be necessary to maintain and continuously update records with data from viability tests, and to keep data on the year, and coded place of increase, etc., of elite and regular distribution stocks for each accession. When the main data files must carry too much of other information, this type of "housekeeping" record might be included in a separate data bank. On the other hand, while it will be useful to maintain records on the distribution of stocks to individuals and other GRC's, these records will be less frequently used and should not limit the efficient use of the main files. It may be possible that this application is again one for the reference type IR system.

Plant quarantine - (4) Access to abbreviated information on plant quarantine regulations would serve a useful purpose in reducing the time required for a user to obtain a sample needed for his research. Considering the value added by almost any new crop variety, the loss of a year in its development could greatly overshadow the investment

required to help him find another GRC source where there would be no restriction on his immediate receipt of the requested accession. If the originating GRC maintains records showing which additional GRC also has the particular accession available the service might be made a simple and routine procedure.

Many other applications, functions and potential complexities of data bank operations could be described at genetic resource centres. That there are needs for efficient computer based information management systems at GRC's is obvious. The time is now to get going with the development activities at the new GRC's before the quantities of information and materials become unmanageable. Some of the older GRC's already can barely provide service and have little or no resources with which to augment or develop data banks that could not only improve their service and efficiency but also reduce waste by encouraging more specific requests for materials.

Some General Concepts and Long Term Goals

1. International Cooperation and Coordination - The need and potentialities for international cooperation and coordination in exploration, conservation, and evaluation and exchange of crop genetic resource materials already has been reviewed in earlier papers. Each of the above activities may depend on or benefit from another. Thus, information available on already existing collections may provide extremely useful input, not only to help justify further and more intensive exploration activities in certain regions but also to indicate when the tactics of exploration should be modified in order to limit duplication and widen the diversity of collections. Conservation must be successful or the investment in exploration will be wasted. Evaluation assures use and shared evaluation

data may expedite plant improvement and other research. The exchange of resource materials aids their evaluation and use, as well as helps to assure that valuable materials will not be lost.

With the development of modern high speed computers and information retrieval systems, each of the various activities mentioned above can more rapidly relate to the other than has ever before been possible. But, to make full use of the capabilities of these new tools we must make more rapid and coordinated progress in the development and use of information management methods and retrieval systems. The selected IR systems not only must be able to manage data we now have and expect to acquire, but also must be available for use at modest operational costs. To be successful, internationally applicable IR systems must permit genetic resource centers to provide a free public service to users. The free exchange of materials and information is a self-sustaining, cyclic process. This free exchange will also help to improve food and fiber research and development activities everywhere.

Relatively few modern, efficient computer information retrieval systems have been developed by and are available without acquisition costs from public agencies. TAXIR may be the only one that is general enough and efficient enough for wide application. The particular usefulness and efficiencies of TAXIR have been described by Rogers (16) and Hersch et al. (5). At WSU we have used two versions of TAXIR for one medium sized data bank on beans (Phaseolus) 6135 accessions, and are in the process of compiling data banks for wheat, barley, oats and peas, including accessions and breeding stocks being maintained or evaluated by local plant breeders.

TAXIR is now being tested by GRC's in Canada, England, Australia, Germany, and Italy as well as at several regional centers in the USA (19,12,18)(Porceddu, personal communication). More and wider study of this freely available system must be encouraged if competence in the management of information by GRC staff is to be achieved in sufficient time to be useful in the planning and organization of plant exploration activities. We know of two freely available reference retrieval systems. One of these is called FAMULUS (21) and the other SOLAR (15). The former system is a batch process, off-line system. The latter is an interactive on-line system. Both should be applicable to the storage and retrieval of data on collections from plant exploration. We plan to test them on data compiled by the Izmir Centre in Turkey. If the application is successful, installation will be made at Ankara University until a sufficiently large computer becomes more locally available to the Izmir Centre.

Other systems for managing any of the many types of data may be available to others and should be tried, since in many cases adaptations or special systems may have to be developed for applications on local machines. Similar principles should apply to the management of information irrespective of the computer machinery used, and the sharing of experiences among users will expedite progress and increase the competence of staff at GRC's (19).

2. Standardized Methods of Data Recording - The development of internationally standardized methods of crop research data recording is an objective within reach. Much progress already has been made and the work to develop potentially standardized approaches is rapidly

gaining momentum. There is of course still much to be done. The ideal of internationally uniform methods may not be reachable particularly because of language barriers unacceptable for some practical applications. However, concepts now developing may have special merit, not only because they aim toward commonly applied methods, but because they already offer a common denominator for internationally standardized data recording methods.

Essentially what is involved first is a numerical system of coding both alternate (discrete) and range types of data (11). The use of numbers is universal. Thus, no conflict with language barriers would likely be encountered. The basic codes suggested include all arabic numerals through nine. The plus (+) code is included to record the presence, in contrast with the absence of a trait or reaction. The use of the zero (0) code is reserved to record absence, none, or no reaction, no response and the immune host-parasite interaction. Because accessions may be mixtures with regard to specific data, the X code is employed.

Uses--when scoring discrete data, as for example flower colors (including some disease response "scales") the entire series of code numbers might be used if necessary and the relation between the codes may or may not have meaning. With range data, however, the most useful scale appears to be as follows:

response	size
1=very low,	very small,
3=low,	small,
5=medium,	intermediate,
7=high,	large,
9=very high,	very large,
x=mixed	

Code numbers 2,4,6,8 might be used for group data as 2=very low to low.

It is also recommended that data normally recorded in percentages use the entire scale 00 to 99. The 100 percent value normally has no real significance especially when the cost of using one more data position is considered. Abbreviated percentage scales might use 00, 10, 20, 30 or intermediate steps as desired.

It would appear then that the basis for an internationally standardized approach to data recording has been developed. As Seidewitz (17) has already indicated, the development of thesauri presenting the complete range of language equivalents for the data descriptors and descriptor states of traits, responses, classes, scores, etc., used in recording data would encourage uniformity on the international scale. It also may be unreasonable to expect that all numerical scales will be adopted readily and universally. Unless other techniques are employed and interpretations made either to input or output data, numerical codes may sometimes prove inefficient. The solution to this problem may be to add alphabetic codes or abbreviations for the terms normally employed in each language. The numerical system could then become the common denominator with which all scales or codes would be compared, facilitating the transfer of data from or to those scale and codes considered more practical or meaningful for local use.

For each crop group illustrated guides will be needed as an aid to standardization. An example of a proposed page for a handbook designed for wheat is shown in Figure 1 for seed shape in wheat. The descriptor, descriptor state, numerical, appropriate alphabetic code and standard terms all are presented. The same illustrations and numerical codes would be employed in guides printed using equivalent terminology

GRAIN SHAPE

DORSAL & VENTRAL VIEWS

Figure 1. Design of description units in illustrated documentation "Thesaurus" in preparation - wheat.

in other languages. However, the term, in the most common language, English, might also be included. Some progress has been made toward the development of suitable handbooks for a few crop plants, and we recommend that the approach be given further consideration by this conference in order that the development of similar scoring guides for other crops will be encouraged and coordinated.

With specific reference to data collected by plant explorers, a standard field collection record is especially important. It need not be burdensome as some plant explorers have feared. Standardization would serve several purposes. It would simplify and make routine the collection of useful data through orderly and prior entry of recording positions needing only to be marked. It would greatly ease data processing, and the consequent comparability of data obtained prove useful to subsequent explorations. Furthermore, standardized records would aid in the training of new plant explorers as is already being done at Cambridge University (J. Hawkes, personal communication). The standard collection record developed with and widely tested by plant explorers in Turkey represents real progress toward a worthwhile goal, and may already have paid for itself in time saved (7,17). Wider testing of this record is needed in order that a universally acceptable record form and handbook might be developed or are under development, but are too numerous to mention here.

3. Expert Evaluation and Compilation of Data - Certain types of data are most useful and confusion can be avoided when their comparability can be judged by a specialist who is provided with adequate background information. This is especially true for disease data. It is unlikely

that genetic resource centres could devote adequate staff time to the collection of performance disease reaction and other evaluation data. Therefore, especially for the major crops, mechanisms must too be developed whereby scientists with expertise will coordinate the evaluation work, facilitate the flow of this extremely valuable information to genetic resource centres. A model for this type of system has proved successful in the USA for acquiring comparable data on the reaction of wheats to specific diseases. Improvements to the system could be achieved by more effective use of computerized data processing, but the essentials are that an expert scientist is assigned the role of coordinating the acquisition and summary of data which may be collected cooperatively by several contributors. It would not be especially difficult to develop a data management system and organization for evaluating new accessions of the major crop species, because scientists in many areas of the world are eager to test potentially valuable new resources.

We envision an international information network within which genetic resource centres will play the key roles. Ways in which regional GRC's might function are illustrated in Figure 2. The system should be interactive in many ways, and each GRC must develop the competence and capacity to achieve a continuing and cyclic flow of information and useful materials. International cooperation and coordinated development of data management operations at these centres should increase the rate and efficiency at which these goals might be achieved. The system proposed as consistent with the concept of a global network of Genetic Resource Centres suggested by Swaminathan (20) and Frankel (4).

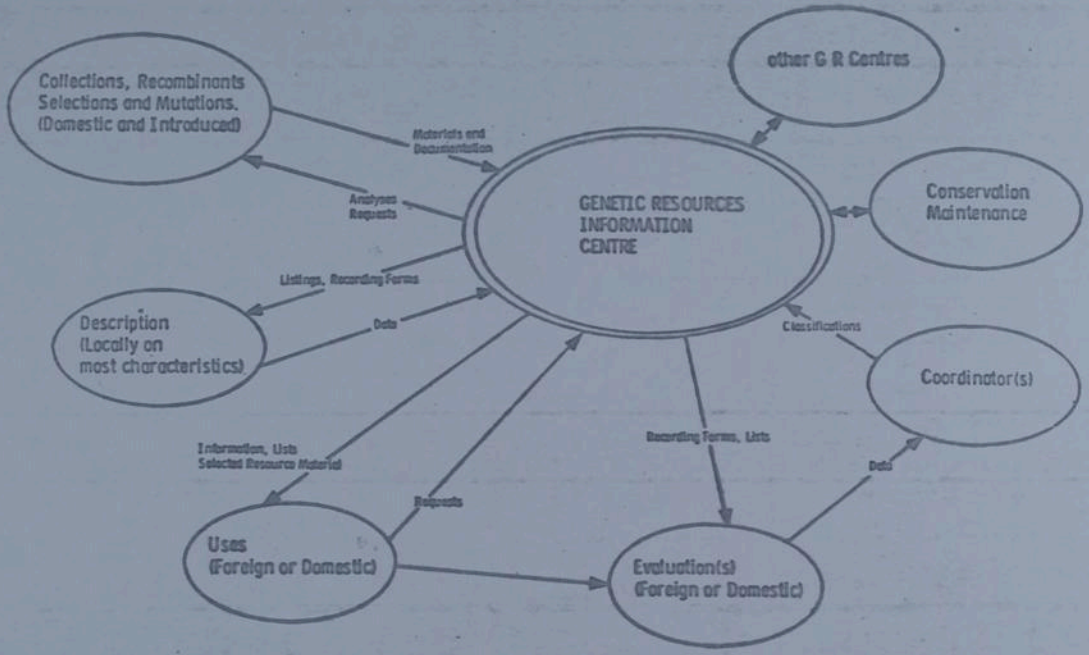


Figure 2. Flow chart illustrating cyclic flow of information and materials between component units associated with national and international regional Genetic Resource Centres.

SUMMARY AND CONCLUSIONS

In this paper we have considered a number of approaches to documentation and data bank development by genetic resource centres. The structure and functional roles of specific types of documentation, relate to use and efficiency in managing information and genetic resource materials. Even with our limited experience we can demonstrate that the computer-based information storage and retrieval systems for the management of information on genetic resources will add measurably to action programs designed for the use and evaluation of these valuable materials as well as for the conservation of existing stocks and explorations for needed additions.

International cooperation and coordinated development of standardized methods for data management systems and techniques is considered vital to the goals of crop exploration and conservation programs as is the training of competent operational staff for the world's genetic resource centres. Current development activities and concepts for future actions are making progress, but needs more emphasis if the needs of programs concerned with conservation and use of crop genetic resources are to be met in time to assure their success.

(1) Berhe, Tareke and C. F. Konzak. Barley in Ethiopia. A preliminary analysis of the USDA Collection of Ethiopian barleys. (In Manuscript).

(2) Chang, T. T. IRRI's role as a genetic resources centre. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(3) Finlay, K. Germplasm conservation of wheat and maize. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(4) Frankel, O. H. Genetic resources centres, functions, responsibilities, and international cooperation. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(5) Hersh, G. N. and D. J. Rogers. The genetic resources centre: Information as a critical dimension - a cost/effectiveness analysis of a system TAXIR on GRC information problems. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(6) Hudson, L. W., R. D. Dutton, Mary Massara Reynolds, and W. E. Walden. TAXIR - A biologically oriented information retrieval system as an aid to plant introduction. Economic Botany 4 (1971) 401-406.

(7) Kjellqvist, E. A regional plan for germplasm collection, conservation and evaluation. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(8) Konzak, C. F., W. E. Walden, and F. P. Sousa. Problems and progress in the management of information on genetic resources. Seiken Ziho 22 (1970) 91-97.

(9) Konzak, C. F., H. Ayla Sencer, B. E. H. Kjellqvist, Nedret Settar, and B. Devecioglu. Standardized documentation of germ plasm collections from plant exploration. Presented at Eucarpia

Conference and at Colloquium by the Agricultural Research and Introduction Centre, Izmir, Turkey. April, 1972. (In Manuscript).

(10) Konzak, C. F., S. M. Dietz, and W. E. Walden. The documentation of collections and information management by genetic resource centres. Presented at Eucarpia Conference and at Colloquium by the Agricultural Research and Introduction Centre, Izmir, Turkey. April, 1972. (In Manuscript).

(11) Loegering, W. Q. Problems of storing plant disease data for retrieval by automatic data processing machines. Washington Agricultural Experiment Station, College of Agriculture, Washington State University, Pullman, Bulletin 705, pp. 6.

(12) Loiselle, R. Plant exploration and collection by Canda. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(13) Qualset, C. O. and J. G. Moseman. Disease reactions of 654 barley introductions from Ethiopia. USDA Experiment Station Progress Report.

(14) Qualset, C. O. Distribution of disease resistance in Ethiopian barleys. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(15) Rickman, J. and P. Mitchell. SOLAR - Automatic storage and retrieval. Ph.D. Thesis, Department of Computer Science, Washington State University, Pullman. 1972.

(16) Rogers, D. J. Requirements of information management systems for genetic resources centres. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(17) Sencer, H. Ayla. Recent and proposed exploration activities of the Izmir Centre. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(18) Seidewitz, L. Descriptors and Thesauri for world GRC documentation. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(19) Snoad, B. Genetic resources centre documentation: Delimitation of the problems. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973

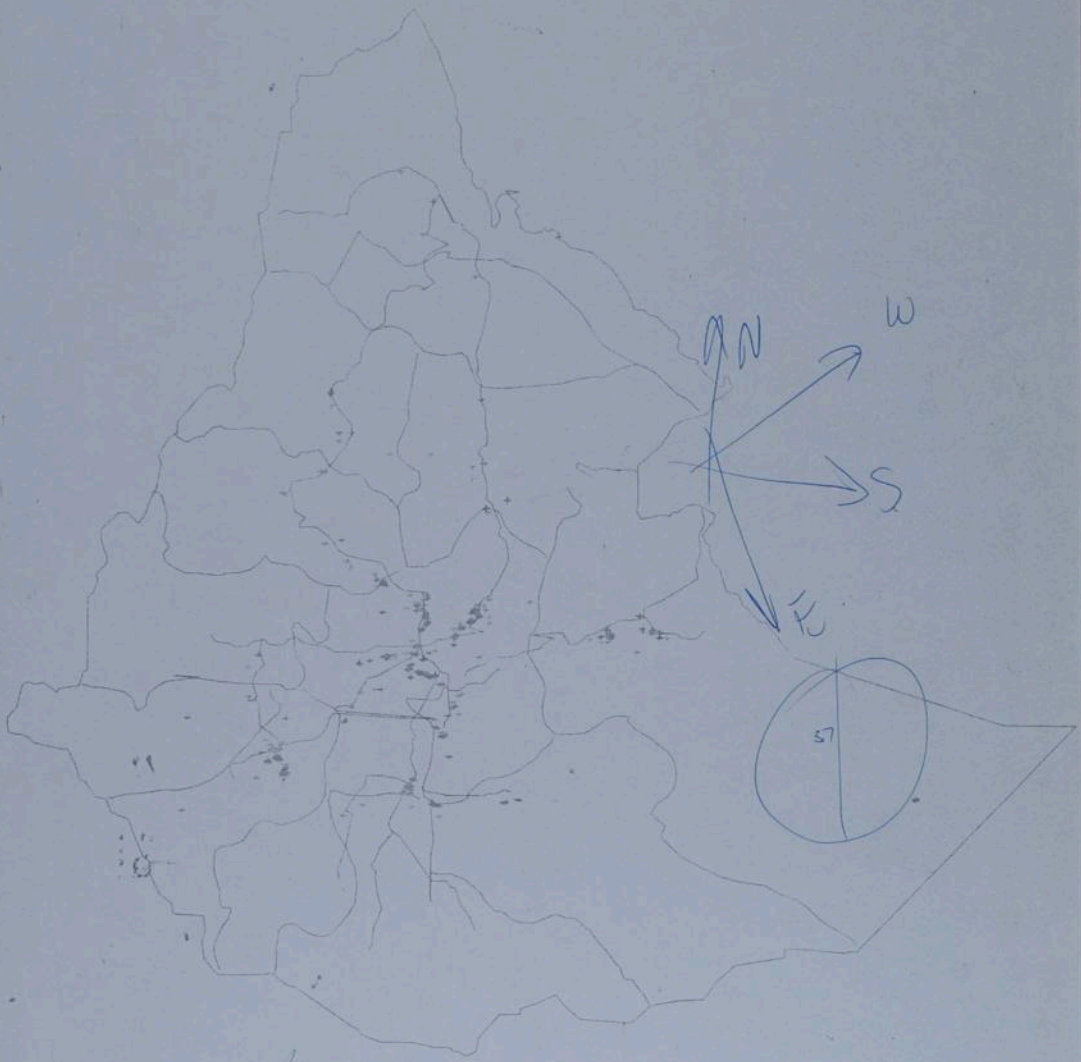
(20) Swaminathan, M. S. A global network of genetic resources centres - an urgent need for sustaining agricultural advance. In Proceedings of FAO Technical Conference on Crop Genetic Resources. Rome, 1973.

(21) Yerke, Theodor B. FAMULUS: A personal documentation system. USDA Pacific Southwest Experiment Station, Berkeley, CA., 1969. pp 39.

USDA GEOGRAPHIC ORIGIN OF ETHIOPIAN BARLEYS

COLLECTED BEFORE 1969

(772 COLLECTIONS - 859 ACCESSIONS)



$$y' = \sum_{i=1}^{nn} x_i y_i / (n-1)^e$$

Digitized by the Hunt Institute for Botanical Documentation

August 28, 1973

Dear Otto:

When Jack was here two weeks ago, he told me that you had taken over the editting of the section on Documentation. I had Conzak's paper to return to him, but he said I should send it right on to you.

It is hard for me to be objective about Cal's paper, because I think that his paper did what I thought it would--repeat much of what he has said already in other places, uses some of the same illustrations as he has used before, and continues to confuse the issues between data standardization and computer programming, and generally obfuscates the whole problem of documentation. My personal advice with respect to it is to summarize his paper in about 4 pages (manuscript), and use that. Summary shouldn't take any more than that to cover every salient point he has made. The salient points for documentation that he makes are already well-covered in Snoad's and Seidewitz's papers, and I don't feel that anything new or different has been added.

But the decision is clearly yours to make, not mine. I include my own notes to Jack, which I intended to give to Jack when he was here.

The delay on all this is caused by my absence, delay in mail, etc. Sorry I didn't get around to it any sooner.

I am still up in the air about the FAO position--that is, the FAO people seem to be still up in the air. So far, I don't think the announcement of the two positions has yet been publicized (or if it has, they have not let me know). I have only the verbal word from both Leon and Albani that there is a job there--nothing at all in writing. Have you heard anything? Pleas let me know if you have.

Best regards,

David J. Rogers
Professor of Biology

Encl.: Konzak's paper.

Sir Otto Frankel
Division of Plant Industry
CSIRO
P.O. Box 1600
Canberra City, A.C.T. 2601
Australia

The University of Birmingham

The University of Birmingham, P.O. Box 363, Birmingham B15 2TT
Telephone 021-472 1301
From: Professor J. G. Hawkes
Department of Botany

JGH/JB

6th June 1973

Professor David J. Rogers,
Department of Environmental,
Population and Organismic Biology,
University of Colorado,
Boulder,
COLORADO 80302.
U. S. A.

Dear Dave,

Many thanks for your letter of May 29th and the manuscript of your paper. I fully understand that Mr. Hersh must have had a great deal of work to do, which would naturally have made it difficult for him to meet the deadline. I have not yet had an opportunity of reading through your text, since we are at present in the middle of University examinations. The paper seems a very long one, and it is possible that I may have to suggest some modifications in order to shorten it. However, I will try and avoid prejudice in this respect when I read it.

Thank you for letting me have the order in which the paper should appear in the book. I will sort this out as soon as I have a moment to do so. I am however seriously worried about the position regarding Konzak. He has already sent me the final version of his paper, though I must confess again that I have not had time to read it yet. Do you really seriously want me to reject it? If so what shall I say to him? You must feed me some ammunition or otherwise use your own gun and shoot him from where you stand. I look forward to having your helpful advice as soon as possible please.

Finally, I note that the report to the assessors of the Pilot Project will be delayed. I look forward to seeing it in due course.

With best wishes,

Yours ever,

Jack

J. G. Hawkes

P.S. Regards to Prof Tayyi, Ebbe & Ayla, please.

Agricultural Research and
Introduction Centre
P. O. Box 9, Menemen
Izmir, Turkey

15 June 1973

Dear Jack,

With respect to Konzak, since I have not seen his final version, (which may be quite different from the one he presented), I cannot really judge its suitability. Is it possible within time to send me a copy in care of Dr. J. Leon at his FAO address? (I will leave here on 21st June and be with Leon until June 25th).

If this is not an agreable arrangement to you, then I suppose the only thing to do is to ask your own judgement with respect to his paper (and please be careful about any mistakes and inuendeus). Then, if you find it appropriate, I would suggest his paper appear after Seidewitz and before Hersh's.

I would suggest that if Hersh's paper has to be cut, then Konzak's should be cut even more. Hersh's paper is a rationally proposed whole, and removal of any part may be damaging to the concept. I have no doubt, however, that there are places where the language can be tidied up and space can be saved by combining paragraphs. Before any part of Hersh's paper has to be cut, I would like to see Konzak's reduced sufficiantly to prevent damage to Hersh's. After all, we have heard from Konzak, and know what he has to say, but Hersh's is entirely new to this field and should be given the room needed.

Best regards,

David J. Rogers

Prof. G. J. Hawkes
Department of Botany
The University of Birmingham
P. O. Box 363
Birmingham B15 2TT
England

DR/ot

FAO/IBP Technical Conference
on
CROP GENETIC RESOURCES

Rome, Italy, March 12-16, 1973

Section 7: Documentation

REQUIREMENTS OF INFORMATION MANAGEMENT SYSTEMS FOR GENETIC RESOURCE CENTERS

David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302

We have seen a series of developments over the past decade which bring us closer to the reality of development of rational, scientifically organized centers where the rich diversity of genetic material that is our inheritance may be properly collected, maintained, and made use of for man's continuing needs for improved crop plants. The developments are in the areas of critical importance: collection, storage, and application. In each area, problems have been faced, and while many unsolved problems still exist, we can confidently expect to start with a good background when the genetic resource center network for the world becomes an actuality.

The Nature and Requirements of Documentation

Concomitant with the studies over the past decade for development of the primary activities of the genetic resource center has been the development of the necessary documentation systems. Documentation, the term used for gene bank data, has several connotations and today includes much more than the mere recording of data about accessions. Documentation today includes accurate data gathering, the processing of that data (either with or without a computing machine) and use of the

data in scientific and management functions. No longer is documentation a matter to be turned over to clerical personnel for the simple reason that the data gathered represent at least 50% of the costs in time and money of all the operations of any scientific operation. Thus, documentation demands well-trained personnel, efficient means of getting the data, storing and retrieving them, and using them. For these reasons, we would like to use the term "information management" as synonymous with the term documentation. Documentation begins the moment the genetic resource center opens its doors, and, given the best possible organization, continues throughout the life of the center.

Snoad, in his contribution to this symposium, indicated some of the fundamental work that was done by international groups to bring out the importance of sound data gathering techniques, at all levels of operation of the genetic resource center. At the time that the work of data organization was proceeding, several efforts have been made to use the capacity of computing machines to handle the massive data which has already been gathered, and to help in managing the continuing accumulation of information. One such effort has been made over the last 15 years in the Taximetrics Laboratory under my direction. Dr. Snoad has described another computerized system developed at the John Innes Institute for the data of the genus Pisum. In an earlier report made in the 1967 Technical Conference, Blixt (1970) provided an illuminating diagramatic representation of the operations of a genetic resource center for Pisum, and indicated the role of the "information centre" in context of the overall activities. Other systems of information handling for documentation of many different scientific endeavors have been developed, for agriculture, for medicine, and for general biological

endeavor. Each of these systems has the common objective of efficient data handling in computing machines, and some are beyond the stage of experimentation and are now in operation. There has been much controversy and conflict and argument about the efficiency of these systems, but each has contributed something of value to the meeting of the objectives of information processing.

It is important to recognize that before computing machines came into being, systems of information handling had been developed--everything from very simple data recording in notebook form, to files in card forms, to edge-punched cards, etc. We learn from each of these that orderly data handling is critical to the scientist, and that the objectives are fairly similar no matter what discipline is being supported. The data for accessions in genetic resource centers, while unique as far as their substantive content is concerned, are structured in much the same way that data are for any other disciplines. That is, we uniformly employ either alphabetic or numeric notation, or mixes of letters and numbers to structure out data. We further learn that at times it is more efficient to reduce the labor of recording our data by use of codes or symbols to stand for some precise statement required (such as intensity of disease resistance), but that at other times we must write out our observations to be certain that we do not loose information. We know that there are cases where precise measurement is necessary to give scientific accuracy, but that at other times, the subtlety of our observations defies the absolute precision of numeric notation, and then we employ qualitative terminology to convey some important aspect. We must, therefore, employ a computer system which gives the most flexibility to permit the scientist maximum

freedom to express the intricacies of his data. Clearly, genetic resource materials are as complex a set of objects to be described as can be found in any science, and for these, we must use our best systems for documentation.

There are other considerations which must be taken account of in documentation systems. There is a basic requirement that the system be capable of taking in many thousands of data, and store them in an efficient manner, whether a manual system or a computerised system. When a storage system becomes burdensome, it usually is abandoned because of the excess time required to maintain it. This has happened much too frequently, as most of us know from bitter experience. Another basic consideration is the ability to rapidly and efficiently find any one datum which has been stored, and this is generally described under the rubric of "information retrieval". Many manual systems have failed because of the inability to find some information buried under some other heading. We have all had the experience, I am certain, that an excellent librarian (or sometimes a good secretary) can store and retrieve information with great accuracy and speed without any visible system, and if all of us were uniformly supplied with these types of dedicated individuals on a continuing basis, there would be little need for any kind of mechanical or electronic system. However, in the setting of this conference, where we are striving for an international network of genetic resource centers, we must inevitably resort to mechanical or electronic devices to aid in the important work of documentation.

Insert here discussion on the structuring of data for input — Concept familiar to most biologists — the taxonomic character. We use the structure of this concept to give the most precise definition of our data — as the taxonomist uses character and character state, we use in TAXIR descriptor and descriptor state. This is very fundamental.

Notion: The descriptor is a descriptive noun or phrase, and the descriptor state is an adjective or adjectival phrase.

Consider the similarity to the Latin binomial used in scientific plant nomenclature — the same structure: a noun (the generic name) and an adjective (the species epithet).

Follow this w/ P.6

out

Other attributes of importance to the documentation of genetic resource data include the ability to add more information to the stored information; the ability to correct mistakes, and to delete the incorrect or obsolete data. These types of functions in a documentation system are "bookkeeping" requirements, and most systems incorporate procedures for this purpose.

Perhaps the critical aspects of the system to the scientist who must use the system is the capacity to get any one piece of information, or any set of data in response to some question, and with reasonable certainty that the response is accurate and exhaustive. The scientist (or user) wants to be able to get the information he needs with the least difficulty, asking questions in his own language, with no necessary intermediate individuals to bother him.

There are many technical problems associated with a computer program for information management which are not particularly interesting to the user of information, but which must be considered when constructing a system which will guarantee results efficiently and economically. These problems involve the type of computer program language, such as FORTRAN, ALGOL, COBOL (and many others), the question of efficient use of the storage capacity of the machine, and the kinds of storage devices associated with a particular computer. There are problems in transferability of computer programs from one computing machine to another (even of the same manufacturer) and these technical problems face us as we organize for a network system for genetic resource centers. Some of the problems are difficult, and others which can be easily solved, given the proper knowledge and skills.

Functions of an Information Management System

Rather than explain the technicalities of computing machine problems for this audience, it is probably more effective toddescribe the workings of one computerized information management system, ENVIRA, which has been developed with the problems of documentation in genetic resource centers in mind.

Follow from P. 4

Each accession brought into the center is associated with a data sheet. These are hopefully standardized forms, and each filled out with the required data: (Figure 1). Each type of data is recorded as a Descriptor, and the precise information given on the data sheet for each data type is a Descriptor State. (Figure 2). The precise form of the data given on the data sheet is recorded on an IBM card, or other input device such as a "mark-sensing" card or sheet, paper tape, etc. in a predetermined order. If proper terminology has been employed initially, the data go directly into the card, or, using the thesaurus of terms provided by Dr. Konsak, Dr. Seidenits and their colleagues, the data may be restructured to fit the thesaurus. After key punching all the data from the data sheet, the batch of cards isthen put into the card reader of the computer, along with the program which directs the functions of the computer for work with the data. Once in the computer, the correction facilities of the program search for errors in key punching, to be certain of correct data. Once the data are "clean" or correct, they are stored in a form which the computing machine can most efficiently use. Recall of the data on demand from the machine is done with program commands, as follows: (Figure 3) PRINT: followed by the precise data

* Please see appendix for explanation

that ~~which~~ is wanted. The included data may all be listed, if it is required to know all the information contained in the data bank, or only portions of the data which satisfy a question given by the user. The question capacity of the program is such that any type of question may be asked, including very complicated inclusion and exclusion types (Figure 4).

Each stage of operation in a documentation center must be gauged first for its effectiveness of results and secondly for the costs. Neither factor may be excluded because of necessary budgetary problems. Anything that can be done to make the processing of the data more efficient and rapid must be adopted. This involves not only continuous training of personnel, but the adoption of machines which can be demonstrated to improve all aspects of the operation. Reprogramming of computing machines is a very expensive process, as I can personally document, and yet there are occasions where it is necessary to adopt better programs to serve the purposes of the genetic resource center. The alert documentalist will be constantly in contact with developments in programming improvements, new hardware facilities, and operating procedures.

GENETIC RESOURCE CENTER DOCUMENTATION FUNCTIONS

With these brief descriptions of the computing aspects of information management, it is important to indicate how these serve the genetic resource center in both scientific and management activities. Below is a list of functions of a genetic resource center which, while not necessarily an all-inclusive one, covers most of the salient functions which will be encountered. These functions may be divided into two types: (A) Basic Required Functions, and (B) Probable Associated Functions.

(A) Basic Required Functions

1. Collection of visble propagules (seeds, cuttings, etc.)

2. Sorting and cleaning.

3. Assignment of accession numbers.

4. Proper scientific identification of accessions

5. Storage of accessions.

6. Continuous testing of viability of accessions.

7. Multiplication of accessions.

8. Restoring multiplied accessions.

9. Providing accessions to appropriate scientists and institutions.

10. Recording results of trials and tests with accessions.

(B) Probable Associate Functions

1. Physiologic studies of germination and storage.

2. Investigation of genetic factors.

3. Taxonomic investigations on the accessioned material.

4. Bibliographic work and reference material.

5. Information retrieval investigations.

Each of the above listed functions has, as a result of carrying out the function, some associated document, or record, with predetermined sets of data. With proper management, each produced document is placed in the data bank as a permanent record. From the scientific point of view, the contained information in the documents is critical to proceed with investigations of any type, whether survey, collection, genetic, physiologic, systematic, etc. From the management standpoint, the information about the collections can be used as an inventory: What is the size of the collection; what rate of increase per year; what more collections, or information about the collection need be made; what library resources

(bibliographic documentation) is available, and what is needed; how often must the collection be tested for viability, for increase; all these items aid the director and his staff to document their continuing financial needs. Not the least use of the information is the planning of continuing operations. The information system (or documentation) is thus critical for the whole operation of the genetic resource center. The value of using a flexible, computerized information retrieval system is that a single recording of the data in a data bank supplies the needs for all functions, both scientific and managerial.

International Network Documentation Requirements

As we examine the problems associated with international networks of genetic resource centers, we can again indicate the central importance of information management systems. Present knowledge indicates the most critical areas in which the centers should be located. Vavilov, of course, provides the major source of information for establishment of centers, and his information was produced in one of the greatest genetic resource centers in the world, at Leningrad.

The functional activities of the individual centers in a world-wide network remain the same as given above, but their connections to other centers requires a higher order of information exchange. However, it is unlikely that all centers would be provided with computing facilities of any size, nor is it necessary. Frequently, because of their location, in centers of agricultural diversity, they will not be near sufficiently large institutions which have the funding to support computing machines. In these cases, primary documentation can be done with the usual low-cost

keypunch, card sorter and printer. The printer can serve the same purpose as a mimeograph (cyclostyle) machine). The distant centers carry out their documentation function by use of techniques known for at least the last three decades in computing installations, using low-cost card readers and printers (referred to in the jargon of computing facilities as "peripheral devices") which use the same input, the keypunch card, which can be used in the centers that are close to computing centers. A duplicate deck of cards can be made at the distant centers, and the duplicate deck sent by mail to the centers with good computing capacity, where the more complex data processing can be accomplished. All that is required in this type of organization among the centers is good management procedures, to establish the flow of the information within and between the centers. One individual in each center can be easily trained to take charge of the peripheral machine functions.

In the event budgetary restrictions prevent even the low cost of installation of peripheral documenting devices, still other management techniques make it possible to process the data, but less efficiently that that given above. The main point which I wish to emphasize in all the above discussions is that the students of documentation have evolved some very efficient techniques, and that documentation has become a supporting science that many agricultural scientists have not been made aware of. We clearly need the best expertise available to support the work of the genetic resource centers, and one of the most critical elements in the documentation activities for genetic resource centers is that of scientific management functions.

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES. Rome, March 1973

(Section 7 : Documentation)

GENETIC RESOURCE CENTRE DOCUMENTATION: DELIMITATION OF THE PROBLEMS

Brian Snoad

Department of Applied Genetics
John Innes Institute
Norwich, U.K.

During the last decade very active consideration has been given by national and international organizations to the collection, conservation, evaluation and utilization of primitive plant material for agricultural development. At the same time it has been recognized that there is a need to develop efficient computer-based recording systems for handling and analysing all the data which will be amassed. Meetings and discussions have ensured that there will be sufficient standardisation of the many techniques and processes associated with the running of genetic resource centres and this uniformity of approach applies equally to information retrieval systems. The 1972 Birmingham Workshop on Information Systems for World Genetic Resources recommended the use of TAXIR (Taxonomic Information Retrieval) system in all genetic resource centres because this sophisticated program with its free format appears to meet the requirements as visualized at the present time. Flexibility of the program is essential in order to obviate the need for rigid standardisation of all data collecting and processing techniques and so TAXIR is now being appropriately tested in a pilot study on general genetic resource data and on data from three centres for potato research.

This introductory paper is intended to delimit the problems of documentation in genetic resource centres and some of the functions of documentation. The experience which has been gained with data contained in a relatively small Pisum collection, using a simple but effective, computer-based information

retrieval system, has provided useful ideas on what to record and how to record it. At the same time, the need for maximum flexibility at all stages has been clearly indicated since it is difficult to anticipate all the demands that will be made on any system.

The establishment of the European Gene Banks, between which there is close cooperation, should be regarded merely as a beginning and the experience with documentation gained in a small number of selected areas in these initial stages of development will prove invaluable. Once enough standardisation has been established to allow for the quick and easy interchange of data and material then will come the time for expansion so that a global network of genetic resource centres and allied documentation systems can be developed.

ABSTRACT.

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES. ROME, MARCH 1973

(Section 7 : Documentation)

The Structure and Organisation of Gene Banks and the Collection of Data.

Brian Snoad
Department of Applied Genetics,
John Innes Institute,
Norwich, U.K.

The development and popularity of new, uniform, high-yielding crop plants has inevitably led to the loss of a great deal of the naturally occurring genetic variability which is to be found in primitive plant material. During the last decade very active consideration has been given by FAO, and more recently Eucarpia, to the collection, conservation, evaluation and utilization of such primitive plant material. At the same time it has been recognised that there is a need to develop efficient but relatively simple to use computer-based recording systems for handling and analysing all the data which will be amassed.

The most encouraging development recently has been the setting up of the gene banks in Bari and Braunschweig-Völkenrode together with the hope that a Scandinavian bank will also be established before long. Meetings and discussions have ensured that there will be sufficient standardisation of the many techniques and processes associated with the running of gene banks and this uniformity of approach applies equally to information retrieval systems. The 1972 Birmingham Workshop recommended the use of TAXIR in all gene banks because this sophisticated program with its free format appears to meet the requirements as visualised at the present time. Flexibility of the program is essential in order to obviate the need for rigid standardisation of all data collecting and processing techniques and so TAXIR is now being appropriately tested in a pilot study on a potato collection.

This introductory paper is intended to help in defining a gene bank and some of its functions. The experience which has been gained with a relatively small Pisum collection, using a simple but effective, computer-based information retrieval system, has provided useful ideas on what to record and how to record it. At the same time the need for maximum flexibility at all stages has been clearly indicated since it appears to be impossible to anticipate all the demands that will be made on any system.

The establishment of the European Gene Banks, between which there is close cooperation, should be regarded merely as a beginning and the experience gained in a small number of selected areas in these initial stages of development will prove invaluable. Once enough standardisation has been established to allow for the quick and easy interchange of data and material then will come the time for expansion so that a global network of gene banks can eventually be developed.

FAO TECHNICAL CONFERENCE

CROP GENETIC RESOURCES

ROME, MARCH 1973

Requirements of Information Management Systems for Genetic Resource Centers

David J. Rogers
Department of Environmental, Population and Organismic Biology
University of Colorado
Boulder, Colorado, USA

ABSTRACT

ABSTRACT

Documentation, which has become the accepted term for the data associated with the accessioned material in gene banks or genetic conservation centers, has slowly accumulated new connotations and concepts. In its simplest sense, documentation is defined as the descriptive information associated with each collection of seeds or other propagating material placed in the gene bank. In its expanded sense, documentation includes all the functions associated with the gathering, filing, (or storing) of the information, and the use of the gathered information. There are two interactive aspects of documentation: one passive, the other active. The former aspect deals with placing the information into some storage system, and the latter is concerned with the application or use of the stored information.

As the information associated with collections of genetic materials has grown in complexity, much effort has been expended on the processes of gathering and storing the information, but relatively little attention has been given to the methods of using the data or values of the information which has been stored. In the more expanded sense, documentation becomes an interactive function as important as any other function of the genetic resource center, requiring study and effort equal to those functions which deal with the genetic resource material itself.

There has been a growing realization of the needs indicated above, and several related or distinct endeavors to improve methods of handling the data have been developed. One of these activities has been the development of a computerized information storage and retrieval systems, and these range from relatively simple storage, sorting, and listing systems to relatively complex computer systems which give more flexibility both for storage and retrieving of the stored information. TAXIR is one complex computerized system, developed by a team in the Taximetrics Laboratory including a

taxonomic botanist, a mathematician and a systems programmer, which has been used in genetic resource centers. This system is now being tested in a pilot project designed to examine several of the problems associated with gene bank data. A report on this pilot project will be given with this report.

In addition to the computerized information retrieval system for genetic resource centers, there are other requirements in gene banks which can be aided by application of management systems. Management implies the overall control of the functions of documentation, including the construction (or derivation) of good scientific data, the flow of the information from the scientist into a documentation system, and the application of the information both for scientific purposes and for determination of the objectives of the gene bank itself. All of the concepts of management are important, including those dealing with costs of operation, and the efficiency of the gene bank to carry out its mission.

As the movement toward the establishment of world-wide genetic resource centers gains strength, there is obviously a need to examine all the associated problems of documentation before we are faced with the actuality of established centers. Planning in advance, taking into account the rich source of information already at hand in several existing gene banks, is important to efficient utilization of funds which will, at best, be barely sufficient to meet the objectives.

FAO/IBP Technical Conference
on
CROP GENETIC RESOURCES

Rome, Italy, March 12-16, 1973

Section 7: Documentation

REQUIREMENTS OF INFORMATION MANAGEMENT SYSTEMS FOR GENETIC RESOURCE CENTERS

David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302

We have seen a series of developments over the past decade which bring us closer to the reality of development of rational, scientifically organized centers where the rich diversity of genetic material that is our inheritance may be properly collected, maintained, and made use of for man's continuing needs for improved crop plants. The developments are in the areas of critical importance: collection, storage, and application. In each area, problems have been faced, and while many unsolved problems still exist, we can confidently expect to start with a good background when the genetic resource center network for the world becomes an actuality.

The Nature and Requirements of Documentation

Concomitant with the studies over the past decade for development of the primary activities of the genetic resource center has been the development of the necessary documentation systems. Documentation, the term used for gene bank data, has several connotations and today includes much more than the mere recording of data about accessions. Documentation today includes accurate data gathering, the processing of that data (either with or without a computing machine) and use of the

data in scientific and management functions. No longer is documentation a matter to be turned over to clerical personnel for the simple reason that the data gathered represent at least 50% of the costs in time and money of all the operations of any scientific operation. Thus, documentation demands well-trained personnel, efficient means of getting the data, storing and retrieving them, and using them. For these reasons, we would like to use the term "information management" as synonymous with the term documentation. Documentation begins the moment the genetic resource center opens its doors, and, given the best possible organization, continues throughout the life of the center.

Snoad, in his contribution to this symposium, indicated some of the fundamental work that was done by international groups to bring out the importance of sound data gathering techniques, at all levels of operation of the genetic resource center. At the time that the work of data organization was proceeding, several efforts have been made to use the capacity of computing machines to handle the massive data which has already been gathered, and to help in managing the continuing accumulation of information. One such effort has been made over the last 15 years in the Taximetrics Laboratory under my direction. Dr. Snoad has described another computerized system developed at the John Innes Institute for the data of the genus Pisum. In an earlier report made in the 1967 Technical Conference, Blixt (1970) provided an illuminating diagramatic representation of the operations of a genetic resource center for Pisum, and indicated the role of the "information centre" in context of the overall activities. Other systems of information handling for documentation of many different scientific endeavors have been developed, for agriculture, for medicine, and for general biological

endeavor. Each of these systems has the common objective of efficient data handling in computing machines, and some are beyond the stage of experimentation and are now in operation. There has been much controversy and conflict and argument about the efficiency of these systems, but each has contributed something of value to the meeting of the objectives of information processing.

It is important to recognize that before computing machines came into being, systems of information handling had been developed--everything from very simple data recording in notebook form, to files in card forms, to edge-punched cards, etc. We learn from each of these that orderly data handling is critical to the scientist, and that the objectives are fairly similar no matter what discipline is being supported. The data for accessions in genetic resource centers, while unique as far as their substantive content is concerned, are structured in much the same way that data are for any other discipline. That is, we uniformly employ either alphabetic or numeric notation, or mixes of letters and numbers to structure out data. We further learn that at times it is more efficient to reduce the labor of recording our data by use of codes or symbols to stand for some precise statement required (such as intensity of disease resistance), but that at other times we must write out our observations to be certain that we do not loose information. We know that there are cases where precise measurement is necessary to give scientific accuracy, but that at other times, the subtlety of our observations defies the absolute precision of numeric notation, and then we employ qualitative terminology to convey some important aspect. We must, therefore, employ a computer system which gives the most flexibility to permit the scientist maximum

freedom to express the intricacies of his data. Clearly, genetic resource materials are as complex a set of objects to be described as can be found in any science, and for these, we must use our best systems for documentation.

There are other considerations which must be taken account of in documentation systems. There is a basic requirement that the system be capable of taking in many thousands of data, and store them in an efficient manner, whether a manual system or a computerized system. When a storage system becomes burdensome, it usually is abandoned because of the excess time required to maintain it. This has happened much too frequently, as most of us know from bitter experience. Another basic consideration is the ability to rapidly and efficiently find any one datum which has been stored, and this is generally described under the rubric of "information retrieval". Many manual systems have failed because of the inability to find some information buried under some other heading. We have all had the experience, I am certain, that an excellent librarian (or sometimes a good secretary) can store and retrieve information with great accuracy and speed without any visible system, and if all of us were uniformly supplied with these types of dedicated individuals on a continuing basis, there would be little need for any kind of mechanical or electronic system. However, in the setting of this conference, where we are striving for an international network of genetic resource centers, we must inevitably resort to mechanical or electronic devices to aid in the important work of documentation.

Other attributes of importance to the documentation of genetic resource data include the ability to add more information to the stored information; the ability to correct mistakes, and to delete the incorrect or obsolete data. These types of functions in a documentation system are "bookkeeping" requirements, and most systems incorporate procedures for this purpose.

Perhaps the critical aspects of the system to the scientist who must use the system is the capacity to get any one piece of information, or any set of data in response to some question, and with reasonable certainty that the response is accurate and exhaustive. The scientist (or user) wants to be able to get the information he needs with the least difficulty, asking questions in his own language, with no necessary intermediate individuals to bother him.

There are many technical problems associated with a computer program for information management which are not particularly interesting to the user of information, but which must be considered when constructing a system which will guarantee results efficiently and economically. These problems involve the type of computer program language, such as FORTRAN, ALGOL, COBOL (and many others), the question of efficient use of the storage capacity of the machine, and the kinds of storage devices associated with a particular computer. There are problems in transferability of computer programs from one computing machine to another (even of the same manufacturer) and these technical problems face us as we organize for a network system for genetic resource centers. Some of the problems are difficult, and others which can be easily solved, given the proper knowledge and skills.

Functions of an Information Management System

Rather than explain the technicalities of computing machine problems for this audience, it is probably more effective toddescribe the workings of one computerized information management system, ENVIRs, which has been developed with the problems of documentation in genetic resource centers in mind.

Each accession brought into the center is associated with a data sheet. These are hopefully standardized forms, and each filled out with the required data: (Figure 1). Each type of data is recorded as a Descriptor, and the precise information given on the data sheet for each data type is a Descriptor State. (Figure 2). The precise form of the data given on the data sheet is recorded on an IBM card, in a predetermined order. If proper terminology has been employed initially, the data go directly into the card, or, using the thesaurus of terms provided by Dr. Konsak, Dr. Seidewitz and their colleagues, the data may be restructured to fit the thesaurus. After key punching all the data from the data sheet, the batch of cards isthen put into the card reader of the computer, along with the program which directs the functions of the computer for work with the data. Once in the computer, the correction facilities of the program search for errors in key punching, to be certain of correct data. Once the data are "clean" or correct, they are stored in a form which the computing machine can most efficiently use. Recall of the data on demand from the machine is done with program commands, as follows: (Figure 3) PRINT: followed by the precise data

---

* Please see appendix for explanation

that which is wanted. The included data may all be listed, if it is required to know all the information contained in the data bank, or only portions of the data which satisfy a question given by the user. The question capacity of the program is such that any type of question may be asked, including very complicated inclusion and exclusion types (Figure 4).

Each stage of operation in a documentation center must be gauged first for its effectiveness of results and secondly for the costs. Neither factor may be excluded because of necessary budgetary problems. Anything that can be done to make the processing of the data more efficient and rapid must be adopted. This involves not only continuous training of personnel, but the adoption of machines which can be demonstrated to improve all aspects of the operation. Reprogramming of computing machines is a very expensive process, as I can personally document, and yet there are occasions where it is necessary to adopt better programs to serve the purposes of the genetic resource center. The alert documentalist will be constantly in contact with developments in programming improvements, new hardware facilities, and operating procedures.

GENETIC RESOURCE CENTER DOCUMENTATION FUNCTIONS

With these brief descriptions of the computing aspects of information management, it is important to indicate how these serve the genetic resource center in both scientific and management activities. Below is a list of functions of a genetic resource center which, while not necessarily an all-inclusive one, covers most of the salient functions which will be encountered. These functions may be divided into two types: (A) Basic Required Functions, and (B) Probable Associated Functions.

(A) Basic Required Functions

1. Collection of viable propagules (seeds, cuttings, etc.)

2. Sorting and cleaning.

3. Assignment of accession numbers.

4. Proper scientific identification of accessions

5. Storage of accessions.

6. Continuous testing of viability of accessions.

7. Multiplication of accessions.

8. Restoring multiplied accessions.

9. Providing accessions to appropriate scientists and institutions.

10. Recording results of trials and tests with accessions.

(b) Probable Associate Functions

1. Physiologic studies of germination and storage.

2. Investigation of genetic factors.

3. Taxonomic investigations on the accessioned material.

4. Bibliographic work and reference material.

5. Information retrieval investigations.

Each of the above listed functions has, as a result of carrying out the function, some associated document, or record, with predetermined sets of data. With proper management, each produced document is placed in the data bank as a permanent record. From the scientific point of view, the contained information in the documents is critical to proceed with investigations of any type, whether survey, collection, genetic, physiologic, systematic, etc. From the management standpoint, the information about the collections can be used as an inventory: What is the size of the collection; what rate of increase per year; what more collections, or information about the collection need be made; what library resources

(bibliographic documentation) is available, and what is needed; how often must the collection be tested for viability, for increase; all these items aid the director and his staff to document their continuing financial needs. Not the least use of the information is the planning of continuing operations. The information system (or documentation) is thus critical for the whole operation of the genetic resource center. The value of using a flexible, computerised information retrieval system is that a single recording of the data in a data bank supplies the needs for all functions, both scientific and managerial.

International Network Documentation Requirements

As we examine the problems associated with international networks of genetic resource centers, we can again indicate the central importance of information management systems. Present knowledge indicates the most critical areas in which the centers should be located. Vavilov, of course, provides the major source of information for establishment of centers, and his information was produced in one of the greatest genetic resource centers in the world, at Leningrad.

The functional activities of the individual centers in a world-wide network remain the same as given above, but their connections to other centers requires a higher order of information exchange. However, it is unlikely that all centers would be provided with computing facilities of any size, nor is it necessary. Frequently, because of their location, in centers of agricultural diversity, they will not be near sufficiently large institutions which have the funding to support computing machines. In these cases, primary documentation can be done with the usual low-cost

keypunch, card sorter and printer. The printer can serve the same purpose as a mimeograph (cyclostyle) machine). The distant centers carry out their documentation function by use of techniques known for at least the last three decades in computing installations, using low-cost card readers and printers (referred to in the jargon of computing facilities as "peripheral devices") which use the same input, the keypunch card, which can be used in the centers which are close to computing centers. A duplicate deck of cards can be made at the distant centers, and the duplicate deck sent by mail to the centers with good computing capacity, where the more complex data processing can be accomplished. All that is required in this type of organization among the centers is good management procedures, to establish the flow of the information within and between the centers. One individual in each center can be easily trained to take charge of the peripheral machine functions.

In the event budgetary restrictions prevent even the low cost of installation of peripheral documenting devices, still other management techniques make it possible to process the data, but less efficiently that that given above. The main point which I wish to emphasize in all the above discussions is that the students of documentation have evolved some very efficient techniques, and that documentation has become a supporting science that many agricultural scientists have not been made aware of. We clearly need the best expertise available to support the work of the genetic resource centers, and one of the most critical elements in the documentation activities for genetic resource centers is that of scientific management functions.

25 November 1972

ABSTRACT:

Title: " The Genetic Resource Center: Information as a Critical Dimension"

Sub-title: A Cost/Effectivness Analysis of System TAXIR on GRC Information Problems.

Authors: Gilbert N. Hersh, Systems Economist
Taximetrics Laboratory
University of Colorado

David J. Rogers, Professor of Biology
Taximetrics Laboratory
Department of Biology (EPO)
University of Colorado

Length: 6-18 pages

Languge : English

ABSTRACT

The Genetic Resource Center: Information as a Critical Dimension

Gilvert N. Hersh

There are many operating Genetic Resource Centers throughout the world. Each differs from any other in its explicit operational characteristics- the methods, procedures and organization used in accomplishing its mission.

There are, however, certain basic implicit operational characteristics which are basic to all GRCs- the function for which it exists: to receive, test, maintain and store genetic resource material and its attendant information; and, to accomplish this so that the material and the information can be shared among users and researchers.

From the implicit operational characteristic that is common to all GRCs, and in fact defines what a GRC is, it is clear that one of the most critical dimensions is the operating information management system in each GRC. Most critical is the appraisal/evalauation of this information system to determine whether or not it is effectively assisting in the GRCs mission- or in reality hampering it.

This paper presents the results and methods used in a study (a cost/effectivness analysis) of the use of the System TAXIR on information management problems for a set of GRCs. Certain techniques were used in evaluating the effectivness of the system including a set of EXAMINERS, themsleves staff members of GRCs around the world.

Several important assumptions and constraints are made in setting up the criteria for the measurement of the system's effectiveness. These are:

1) each GRC has and information management system- no matter how crude or sophisticated.(Each system can be evaluated in terms of its cost/effectivness and compared with any other system.)
2) The problems faced by each information system are more or less the same as those faced by any other GRC information system.

3)The information management system speciifc to a GRC was adopted or developed by the GRC staff to meet certain specific operational needs and constraints.

4)The GRC staff personnel (scientists) should determine the operating characteristics of the information system in order to meet their needs. It should not be"forced" on the staff.

5)some GRCs are satisfied with their current information system and do not wish to change their procedures.

6) Some GRCs realize that their current information system is not adequate for their present needs and wish to introduce a new system which would be easy to use (no need for constant computer technologist intervention) and which would be highly flexible to handle new problems and new methods.

7) Some GRCs realize that their current system will not handle the increased load which is expected in the near future.

8) Most GRCs realize that their current information system will not be useful in sharing information with other GRCs or users with different systems.

9) Some type of GRC information sharing will be necessary in the short run and will be necessary after some years.

The criteria used to measure costs include:

1) the actual time/equipment costs attendant with the use of the TAXIR System.

2)The actual cost of data conversion from a GRC system to TAXIR.

3)The cost of training an EXAMINER to use the TAXIR System (query)

4) The Projected Costs for the installation of TAXIR at a GRC- and the cost of information systems conversion.

The paper concludes in suggesting how the TAXIR system could be employed in a minimum manner to provide a common communication net and service to any GRC should that GRC desire the service while meeting the assumptions and constraints listed above. Some approximations are made to cost of accomplishing this.

The Appendicies include detailed information on the study, a flow chart for at evaluation of a CRC's current information system, and a suggestion for comparative information sharing of such data among the CRCs.

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES. Rome, March, 1973

(Section 7 : Documentation)

DESCRIPTORS AND THESAURI FOR WORLD GENETIC RESOURCE CENTER DOCUMENTATION

L. Seidewitz

Institut Pflanzenbau FAL
West Germany

The following requirements were recognised when developing the documentation system for a genetic resource centre: flexibility; ease of handling; generally understandable; independence from minutia of rules for data presentation; comprehensiveness; no restriction in the application for a wide range of crops; compatability with already existing documentation systems of other genetic resource centres, individual breeders and those organizations involved in protection of bred varieties and breeder's rights; data compilation for specific needs; transferability into different languages; capacity to incorporate detailed information about the genetic resource (collection), or general information from other genetic resource centres.

After examination of several documentation systems, the system to be presented combined the best features extracted from all the systems examined. A comprehensive listing of the descriptors and descriptor states, called a thesaurus, translated into different languages, gives an idea of how documentation for genetic material should be prepared.

Coding of descriptors and descriptor states in documentation follows standardisations that are already internationally acceptable, conserving space and time by use of abbreviations, letters or numbers. The numbers correspond to the descriptor states, a low number indicating a low expression of a characteristic, and a higher or more intense expression is represented by higher numbers, as follows:

1--very low, very shallow, very small, very early, very bright, etc.

2-- *

3--low, shallow, small, early, bright, etc.

4-- *

5--intermidiate

6-- *

7--high, deep, big, late, dark, etc.

8-- *

9--very high, very deep, very big, very late, very dark, etc.

* Numbers 2, 4, 6 and 8 were omitted because, from a genetic resource centre point of view, it seems impractical. In most cases, very little additional information is gained by incorporation of the intermediate numbers.

The letters H, I, R, S, T may be applied in connection with the coding of descriptors of reactions to pests and diseases, e.g.:

H--hypersensitive

I--immune

R--resistant

S--Susceptible

T--tolerant

For a simple yes/no coding, the symbols "+" and "0" may be used, "+" = present, "0" = absent. For those cases of "not uniformly expressed", the symbol "X" may be used as a coded descriptor state.

For international documentation in the world network of genetic resource centres, a multilingual thesaurus and forms for the registration of data will be presented to the conference.

The documentation Work at the German Genebank Braunschweig-Voelkenrode

by L. Seidewitz

The following demands had to be regarded when developing the documentation system for the genebank:

- flexibility;
- easy to be handled;
- generally understandable;
- independence from minutious rules for data presentation;
- comprehensiveness;
- no restriction in the application for a wide range of crops;
- compatability with already existing documentation systems of other genebanks, individual breeders and those organizations involved in protection of bred varieties and breeder's rights;
- data compilation due to specific needs;
- transferability into different languages;
- the uptake of extensively detailed information accompanying the material (or general information from other genebanks).

Various documentation systems had been examined as to the justification of those demands. The system presented to the conference is the result from the best features extracted from already existing documentation systems.

Basis for the documentation are corresponding descriptors to be used in combination with certain states for expression of the modification of a descriptor.

In order to show the kind of descriptors, those had been referred to various cropping plants. This type of comprehensive listing - called thesaurus - is translated into different languages in order to give an idea how documents on genetic material should be prepared.

Although coding in the documentation was not appreciated the genebank turned to follow aspects of standardized presentation of descriptor states that are already internationally discussed.

For space and time saving reasons descriptor states are represented by means of letters and numbers. The numbers correspond to the descriptor states, i.e. a low number stands for low expression of a characteristic and raising expression is represented by higher numbers, e.g.

1-very low, very shallow, very small, very early, very bright
2-
3- low, shallow, small, early, bright
4-
5-intermediate
6-
7-high, deep, big, late, dark
8-
9-very high, very deep, very big, very late, very dark

Numbers 2, 4, 6 and 8 were left out because from a genebank point of view it seems impractical since it hardly expresses any difference between 1 and 3, 3 and 5, 5 and 7, 7 and 9.

So far other coding is not practicable letters H, I, R, S, T could be applied in connection with the description of reactions to pests and diseases:

H-hypersensitive
I-immune
R-resistant
S-susceptible
T-tolerant

For a simple yes/no documentation the symbols "+" and "O" can be used, i.e. + = "present", O = "absent" and a not uniformly expressed characteristic is coded by "X".

For the international discussion about basic documentation as to the world network of genebanks a multilingual thesaurus and forms for the registration of data are presented to the conference.

DOCUMENTATION OF GENETIC RESOURCES--TYPES OF INFORMATION, USES, AND INTERNATIONAL COOPERATION

C. F. Konzak

Much of the documentation of collections from plant explorations is primarily of local interest and usefulness. The complete information can be of great value to the agencies involved in the current explorations as well as to agencies planning new explorations. However, portions of the original documentation of collections may have wide use and should be included in a standard readily accessible record. There is need to distinguish in some simple and quickly discernible way materials originating from plant explorations, from selections and improved varieties coming from experiment stations. Bonafide collected materials, particularly those with a broad base, are likely to include more variability than derived lines, and everyone working with them should be alerted to the need to manage them in a different manner.

As the plant breeder would not manage segregating populations in the same way he does pure lines; it is illogical that all plant introductions be handled as if they were uniform material.

Certain basic descriptive data are useful for identification, not only by the eventual user, but also aid in the conservation activities. These data should be collected as soon as possible, preferably by the original maintenance center.

Data such as on reactions to diseases or on agronomic and quality features might be collated by scientific coordinators able to evaluate and assess data collected from various sources. Other records needed include "housekeeping" information such as stock location, quantity, viability, etc., as well as records on distribution and duplicated conservation. Internationally standardized methods for recording data are important to their universal intelligibility. Handbooks with clearly defined procedures and illustrated descriptions associated with standardized codes and terms having multilingual equivalents must be developed to achieve that goal.

September 13, 1972

Dr. Mario Gutierrez
CIMMYT
Londres 40
Mexico 6, D.F., Mexico

Dear Dr. Gutierrez:

You may recall that we met in 1968 when we were attending an international conference on information retrieval held at Universidad Nacional. Since that time, I have continued my interest in the problems of information for biological problems, and have further developed the system, TAXIR.

As a result of my continued interest in these problems, I have been asked to organize a half-day symposium on documentation and information for the joint FAO-IBP Technical Conference on Genetic Resources to be held in Rome, in March, 1973. As organizer, it is my pleasure to invite you to participate by presenting a 20 minute formal paper on the activities in connection with documentation of the CIMMYT gene banks.

If you are interested in participating, please let me know at your earliest convenience, and I will provide details and background information for the technical conference.

I look forward to your acceptance of this invitation.

Sincerely yours,

David J. Rogers
Professor of Biology

The Rockefeller Foundation
111 WEST 50th STREET, NEW YORK, N.Y. 10020

AGRICULTURAL SCIENCES

CABLE: ROCKFOUND, NEW YORK
TELEPHONE: COLUMBUS 5-8100

September 8, 1972

Dear Dr. Rogers:

I would suggest that you contact Dr. Mario Gutierrez as the individual most knowledgeable and engaged in the maintenance of the corn germplasm in CIMMYT's gene bank.

His address is:

Dr. Mario Gutierrez
CIMMYT
Londres 40
Mexico 6, D.F., Mexico

Sincerely yours,

Lewis M. Roberts
Associate Director

Dr. David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302

LMR:cs

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F

Norwich 52571

BS/td

5th September, 1972.

Dr. D. J. Rogers,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

Dear Dave,

Many thanks for your letter of 7th August inviting me to participate in the Symposium on Crop Genetic Resources to be held in March 1973. Please accept my apologies for this delayed reply but I have been away on holiday.

I would be very happy to attend the Symposium and to give a talk on the lines that you suggest. I will give some thought to the title that you propose and let you know as soon as I can what sort of content I think would be appropriate. You can then let me have your comments before I prepare an abstract for FAO.

I am very pleased to learn that travel and daily expenses will be met by FAO or IBP since I would find it difficult to get finance from the A.R.C at what they would consider to be such short notice!!

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME | Cables: FOODAGRI ROME | Telex: 61181 FOODAGRI | Telephone: 5797

Ref. AGPE - PL 2/8

SEP. 4 1972

Dear Dr. Rogers,

I am writing to acknowledge your letter of 17 August together with a proposal for a Pilot Project for Genetic Resources Centres.

Dr. León is at present on home leave and is not expected back in Rome until Monday, 11 September. However, on his return I will draw his attention to your deadline of 15 September.

Yours sincerely,

A. L. Zaniboni

Secretary to Dr. J. León
Crop Ecology and Genetic Resources Unit

Dr. David J. Rogers
Professor of Biology
University of Colorado
Boulder
Colorado 80302
U.S.A.

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F

Norwich 52571

BS/td 15th January, 1973.

Professor D. J. Rogers,
University of Colorado,
Boulder, Colorado,
80302, U.S.A.

Dear Dave,

Many thanks for your letter of 11th January and for the enclosures.

I am quite happy with the amendments made by you to the abstract which I submitted at the end of last year. I only hope, however, that this will meet with the approval of Otto Frankel and Jorge Leon so that I can go ahead with the full text of the paper.

Unfortunately I know nothing at all about the full scope of this Conference on Crop Genetic Resources apart from the inclusion of this one section devoted to Documentation. I was under the impression that you wanted me to give an introductory paper setting out the development of Genetic Resource Centres and their documentation systems so that the subsequent speakers could then give details of the specific aspects with which they have been concerned. If I am to confine my comments to documentation and to ignore what might be called the "historical aspects" then I have to be careful not to anticipate the details which will be given by these subsequent speakers.

I am sure that you will understand my predicament and I would appreciate receiving your comments, and perhaps guidance, as soon as the post will allow, so that my talk will be certain to fit properly into the Conference as a whole. In the meantime I will go ahead with the preparation of the full text using the modified abstract as a guide.

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

cc. Sir Otto Frankel F.R.S.
Dr. J. Leon.

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99163

DEPARTMENT OF AGRONOMY AND SOILS

January 15, 1973

Dr. O. H. Frankel
Division of Plant Industry
C.S.I.R.O.
P. O. Box 109
Canberra City, A. C. T. AUSTRALIA

Dear Otto:

Thank you for your letter about the Rome meeting. I do recall now the note in your letter about IAEA support but I felt you, Rogers or Leon would follow up the subject further as meeting plans were more advanced. I interpreted Sig's comment at the time to be largely administrative in that until he had evidence from me (which he now has in preliminary form) he could not request travel for me. I may not receive approval of my professional leave request until March, but could feel that if approved at the department level it is likely to be approved higher up. I have written a note to Sig about the matter and have enclosed a copy of your letter. Hopefully they can act in time for me to get approval here and someone to take my lectures and labs. In case it does come through, I should receive information soon about the program and what my contribution should cover. It will still take some extra effort to make tests on collection records from Izmir which I wrote for and to have the Ethiopia and Turkey data available. We are preparing data on the Turkish durums in the USDA Collection also for a meeting in May.

We should (hopefully) have the preliminary report typed and off to you and others this next week, and we will attempt to estimate answers to your questions in the text. Your points are quite pertinent and we will be able to make definite statements on most of them, especially when the data are processed. The collections from markets probably represent populations, and may be the only ones that do. John Moseman, Joe Craddock and Gus Wiebe could better describe the method of building the CI collection from the PI's. We know many CI's of barley were from mixtures in wheat and oats collections, and in many cases several CI's trace to a single PI. It will be no problem to get statistics on the latter. What may be interesting is listing the collections made by each individual explorer. Our general impression now is that virtually all of them followed main roads. I tend to feel now that if a good job of

sampling is to be done, it may be necessary to enlist cooperation from the local military helicopter escorts, and to get the US Space Agency to shoot some remote sensing photographs just ahead of crop maturity in order to locate the fields in the more remote areas from where the collections would be most valuable.

Sincerely,

C. F. Konzak
Professor

CFK/am
CC: J. Loon
B. Sigurbjörnsson
D. Rogers

Jan 11, 1973

Dear Lothar:

Enclosed are a copy of my rewording of your abstract and a copy of a letter from Otto Frankel, which is the stimulus for rewording your abstract. First, Jorge Leon had written in December, asking that I reword your abstract, but I wrote back to him telling him I was satisfied with it. Second, Otto wrote, and his demands are much more impressive than were those of Leon, so I decided to go ahead and rewrite your abstract for their benefit. While I was happy with what you had written, clearly both Leon and Frankel were not, so, to keep them happy, I went ahead.

You will note that I changed the title, again, for Otto's criticism. Please check to see whether anything in the rewritten abstract offends you, is incorrect, or something you do not consider correct. If you have any changes to make, please send them direct to Jorge Leon, with a copy to me.

I have also done the same for Brian Snoad, and a copy of his reworded abstract is enclosed.

Don't forget that they want a full text of your paper by Feb. 1. Please take into consideration changes made in the abstract.

Sincerely,

David J. Rogers
Professor of Biology

Enclosures.

P.S. The original of your reworded abstract has already been sent to Leon.

Jan. 11, 1973

Dear Brian:

Enclosed are a copy of my rewording of your abstract and a copy of a letter from Otto Frankel, which is the stimulus for rewording your abstract. First, Jorge Leon had written in December, asking that I reword your abstract, but I wrote back to him telling him I was satisfied with it. Second, Otto wrote, and his demands are much more impressive than were those of Leon, so I decided to go ahead and rewrite your abstract for their benefit. While I was happy with what you had written, clearly both Leon and Frankel were not, so, to keep them happy, I went ahead.

Please check to see whether anything in the rewritten abstract offends you, is incorrect, or something you do not consider correct.

I have also done the same for Lothar, and a copy is enclosed.

If you have any changes to make, please send them direct to Jorge Leon, with a copy to me.

Don't forget that they want a full text of your paper by Feb. 1.

Sincerely,

David J. Rogers
Professor of Biology

Enclosures.

Jan 10, 1973

Dear Jorge:

I apologize for my quick response to your letter asking for corrections in the abstracts for the section on documentation at the upcoming technical conference. A letter just arrived from Otto, though dated Dec. 15, and he was much more emphatic than you about the requirements for change. I have, therefore, gone over the abstracts of Snoad and Seidewitz, and the changes are enclosed. I trust that it is not too late.

I hope the enclosed are an improvement, and these will serve your needs better. I should have had a better idea of what was expected from the participants, because I thought there would be an opportunity to modify any part of the presented material in light of any changes that would come from the conference itself. Sorry I did not know.

Sincerely,

David J. Rogers
Professor of Biology

Encl.: Two abstracts by Snoad and Seidewitz

Reference: AGPE - PL 7/40, Dec. 5, 1972.

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99163

DEPARTMENT OF AGRONOMY AND SOILS

January 9, 1973

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, CO 80302

Dear Dave:

Jorge Leon wrote in reply to me that the FAO IBP meeting in Rome is going ahead as planned for March. However, I still do not have any information from you relative to the plan for the documentation part of the program and no further word from you relative to the paper you asked me to present when you called in October (I believe). Since time is getting on and I have since been considering some alternatives which may be better than TAXIR for the actual field collectors records, I would also hope to have some new results since the meeting in Turkey.

We also have collated some quite striking information in the collections of Ethiopian barleys in the USDA Collection that suggests other ways that documentation can be used to help in planning future explorations.

As time is getting short, please reply soon.

Sincerely,

Cal

C. F. Konzak
Professor

CFK:dl

AIRMAIL

Dave - this is my reply to a letter from Cal complaining that he had received an invitation to attend as "observer" (a pro-forma invitation from FAO to him and scores of others) but not to give a paper which he wants to do, and he says I had conveyed to him that he would receive financial assistance, whereas from Izmir onwards I had told and written him that this was quite out of the question.
O.

OHF:JFW
Ref:

8th January, 1973.

Dr. C.F. Konzak,
Department of Agronomy and Soils,
Washington State University,
PULLMAN. WASHINGTON. 99163.

Dear Cal,

Technical Conference 1973.

Thank you for your letter of December 29 which only reached me today. I answer the points you raise separately since one concerns FAO.

I am sorry to see that there is a degree of misunderstanding regarding your participation in the Rome meeting. You will recall that we discussed this matter at Izmir where two facets emerged. First, you (and everyone else) seemed to favour the idea that Dave Rogers should attend and make a major contribution. Second, I thought it unlikely that our funds would permit our paying travel support for more than one U.S. participant in this section, and I undertook to approach IAEA. Before I could discuss this matter with Jorge León, he had already approached Sig who told him quite firmly that there was no chance of IAEA support, unless your participation was linked with your sabbatical term at IAEA.

I reported this to you during my stay at FAO in October - November and expressed my regret that we had no other source of finance available. We had to ration severely our support for people from developed countries involving expensive travel, especially in view of the small number of participants from developing countries necessitating the channelling of any available resources to this end. While the record of this correspondence is at FAO, I clearly remember having made the position very clear, viz., that unless you can find a source of finance yourself we shall have to miss your contribution. To this I never got a reply from you and I advised Dave Rogers accordingly. This is the reason why you are not shown on the programme and, with many others connected with Genetic Resources, were placed on Jorge's list of formal invitations.

There will be no difficulty about including a paper by you should you be able to attend; but since there is pressure on available time, it would have to be fairly brief. We have had to warn everyone to this effect. The exact time is a matter for agreement between you and Dave.

I am sending copies to Jorge and Dave and hope you will be able to make suitable arrangements.

Best regards.

Yours sincerely,

Dr. D. Rogers,

Copy referred for your information.

(O.H. Frankel)

Mar. 23, 1973

Dear Jorge:

First, thanks very much for your many courtesies, information, advice, and for the delightful dinner on Friday night, last week.

The prospects of working with you on problems of mutual concern please me. There are several points that I think you gave me answers for, but I am either vague on the answers, or have forgotten them. Since, however, there seems every certainty that I will get the job, I have taken the liberty to go ahead and think about what the work is to be, and perhaps the points where I am vague (or have forgotten) you will be able to see, and at the same time, discover how I have been looking at the work. I have attempted to see some of the things we will need, and some activities which could actually be started before I arrive in Rome.

First, personnel. I recall that a personal secretary was included, but no other positions named. There clearly will have to be additional personnel, and I assume that they are to be named as "consultants", at least at first. From my experience, the minimum number of people necessary to work are as follows:

1. Systems analyst. To aid in both the organizational and computer work.

2. Computer programmer. To make our systems (computer programs) generally workable on machines in Rome, and in selected centers.

3. Data manager. A person to take data from the genetic resource centers and organize them for processing.

4. Key punch operator. The operator can serve several clerical functions in addition to that of punching data cards.

Second, travel. This has to be determined after we get a picture of the overall operations. The overall operations depends upon the priorities set by the Panel, or other group who are your "board of directors". Where I go when is surely determined by these priorities.

Third, systems analysis of the network. Essentially, this provides the means by which we move from objectives to results in the most expeditious manner. I won't provide any more detail on this subject in this letter, but will show you how this is an integral part of the network building when there is more time and space to do so.

Fourth, TAXIR installation. The first task we have is to get this program going at some computing facility in Rome. Whether we work with the machine owned by FAO, or some other machine outside FAO, will depend on the wishes of the FAO Computing Center itself, and on the suitability of their computing

machine for this type of work. Clearly, we will have to install the programs on suitable machines in the centers, but that comes after we have first done the main work in Rome.

Fifth, research and development. Though TAXIR has many capabilities as it stands, it is very likely that we will want additional subroutines added to the main program to supply various needs of the centers. There are also needs to investigate various means of fast communication between computing machines, centers, and personnel, and this constitutes a part of the task we face.

Sixth, data conversion. We know that there are already a number of data banks in various centers waiting for FAO's coordination. These different centers are almost certain to be eager to get going with the FAO system, and will want us to supply them the ability to proceed very soon. Because we know that these people will be putting pressures on us right from the start, we feel that we must be somewhat prepared before we even start to work.

Now, the reason I go to some length in the above explanation is to tell you what I think we may need in the way of an operating budget. When I figure the personnel costs, their expenses, travel, computing costs, and my travel, I get a figure a little over $100,000 annually. I believe that the figure is very close to the one you mentioned that I would have available. If that is true, then we're fine. (Recall the first part of this letter mentioned my vagueness on subjects). If my figure is high, then we'll have to see how to function at some less than effective rate.

Please let me have your reactions to the above. May I also ask you to get your secretary to send me a telephone directory for FAO? Also, if there are any brochures that indicate the various programs of FAO, I'd like to have it.

But first of all, Jorge--get well!

Sincerely,

Jan. 29, 1973

Sir Otto Frankel
CSIRO
Canberra City, A.C.T.

Dear Otto:

Yours of 23rd Jan. just in. I have complied with your suggestion to go ahead with an invitation to Cal. I hope this problem is cleared up now, but knowing Cal, I doubt that it is. A copy of my letter to him is enclosed.

I am disappointed in Snoad's contribution, and am a little surprised at it. You saw my set of suggestions to him, and you should have received by now a new abstract which I rewrote for him. I think, however, that it will all straighten out before the conference, and certainly before final submission of manuscript for the book.

My initial design for the documentation section was that there would be a very short review of the previous work done in documentation--certainly not a full history of the efforts made over the last 6-7 years. All that Snoad was supposed to do was pull the first stages of the concept of documentation together, and to use his own experience with Pisum as an illustrative example. Then the other papers will be sufficient emphases on various critical aspects of documentation, and mine to be the summarization of it all.

Now, in the symposium itself, I will introduce the topic, but will not, in the introduction, give the whole paper which I want to be a recapitulation, and final overall survey of where we stand. This strikes me as most appropriate as the last in line. I expect that this part of the whole conference will draw some of the most active discussion, and I want to be sure to set the stage for this discussion, just before we open it up to the audience for participation.

Will the above be a satisfactory organization? Hope it makes it--your input (if I may use the jargon) has been definitely beneficial to sharpening things up.

Sincerely,

David J. Rogers
Professor of Biology

Jan. 29, 1973

Dear Kal:

Otto has just sent a letter saying ok to adding your presentation to the Technical Conferance, Section 7, Documentation. That clears up part of point 3 in my letter to you 3 days ago--its okay to go ahead.

So, why don't you put into your paper something that will fit with the general thrust of the papers we're giving, with the general theme of your paper to be the most critical gene bank data. What we are attempting to do is give an overall picture of the functions of documentation in genetic resource centers, from the initial point of collection through each of the stages. Yours would be the area of your greatest expertise--what are the critical data for each of the stages, no matter which crop is involved.

As you know, the time is late, so perhaps you can quickly prepare an abstract, and send the original to Jorge, and the copy to me. The abstract should not be more than 500 words. The paper should be about 15 to 20 minutes, no more, because we hope that we will generate lots of discussion, and the more time for that the better.

Let me know as soon as you can of the success you have with travel support. It will be necessary to make a few adjustments in the other presentations to fit your in.

Sincerely,

David J. Rogers
Professor of Biology

Jan. 26, 1973

Dr. C.F. Konzak
Dept. of Agronomy and Soils
Washington State University
Pullman, Washington 99168

Dear Cal:

In response to yours of the 22nd, the only comments I can make are as follows:

1. On June 7, I submitted a preliminary list of speakers to Otto, including you as one of them. I also, in that letter, conveyed to Otto and Jorge that you could possibly get travel funds from the IAEA, if they would make the application, and in a reply of 27 June, Otto told me that there was nothing he could do to apply for funds from IAEA for you, since Jorge had already contacted Sigurbjörnson, who told Jorge that unless you could come in connection with your sabbatical, there was no support. I assumed from this that you would have communicated with Sigurbjörnson, which is justifiable, and certainly not for me to do. If Otto and Jorge chose not to inform you of the Vienna decision, I cannot see where I could have done anything additionally.

2. Jorge and Otto are responsible for the financial arrangements for the conference. I merely organized the section on documentation, with clearly no financial responsiblity. I was informed that funds were most needed to bring people from developing countries to the conference, and that they could support only one speaker from the western US. This, plus the considerations in number 1 above, made it necessary to revise the preliminary list of speakers, excluding your contribution.

3. If you can get the Vienna people to support your travel, I believe that we could find a small time segment on the program, although at this date, I would have to get the permission from Otto to do so. If you want, I can say this in a letter to the IAEA, as an aide in your application to them for support.

Sincerely,

David J. Rogers
Professor of Biology

Jan. 19, 1973

Dear Brian:

I'm sorry for the confusion in your mind, the result of inadequate communication from me. Somehow, I assumed that you would know the full scope of the meeting in Rome, though now I can't imagine how you would know, since Jorge sent me a copy of the proposed general agenda, which included the full 8 sessions, number 7 of which is documentation.

I had hoped that you would cover the historical aspects of the various groups to bring about good documentation, and such history would include the first efforts at data recording (a guide sheet for types of data, and the construction of the data), various types of general file systems employed (only in very broad outline), efforts in different laboratories with such primitive systems as edge-punched cards, (if you know any of those), first trials with card-punching and sorting devices, some of the various efforts at developing information retrieval systems (of which you can expand on your own development), and present status of such systems.

Throughout our session, we should all attempt to point to the fundamental importanbe of data associated with the collections of seeds and other propagules. The genetic material is essentially value-less unless the information is associated with the genetic material from first collection throughout its use. Furthermore, we want to point out that documentation provides the basic source of information for guidance in the genetic resource center management. Somehow, the idea that the function of the center is dependent on what is known about the data in the center, for determining what the present status of the genetic material is, the need to collect new material, and what policies the institution will have in the future, is all important for us to bring to the attention of the conferees. In the past, it seems that data-gathering and management was thought of as a very side issue, to be done only as a last resort, or by low-order personnel.

The scientific value of the data can also be stressed, in addition to the "management" aspects mentioned in the above paragraph. In order for the world-wide network of genetic resource centers to be certain of their coverage of genetic materials, they must be able to know what they already have described, in order to measure their success in meeting their objectives scientifically. Clearly, information will help guide our future tests of the genetic materials, and the merit of the information will then be of most critical importance.

I hope the above words give you a clearer picture of the content of your talk. Lothar's contribution should give a picture of present-day thinking on data. Hersh will speak of the management aspects and how to use the information, and Rogers will talk about the potential values of one computing system, as exemplified (in part) by the Pilot Project. Thus, we have a good review of where x we are todsy, and where we are going in the future (but all relevant to documentation first, and to the general functions of the genetic resource center second.

If still not clear, let me have your questions again.

Jan. 18, 1973

Sir Otto Frankel
CSIRO
Devision of Plant Industry
P.O. Box 1600
Canberra City, A.C.T. 2601
Australia

Dear Otto:

Enclosed are my letters to Cal Konsak. They are self-explanatory.

I had also received your letter to him, which helped in making the proper response to him.

I have sent corrected abstracts of Snoad's and Seidewitz's contribution to the session on documentation to Jorge. I at first thought the generality of the abstracts was all right, but agree that they were a bit too general for the purpose. They have been corrected.

Sincerely,

David J. Rogers

UNIVERSITY OF COLORADO
BOULDER, COLORADO 80302

Department of Environmental,
Population and Organismic Biology

January 18, 1973

Dr. C. F. Konzak
Department of Agronomy and Soils
Washington State University
Pullman, Washington 99163

Dear Cal:

I have just returned to office, and found your letter of Jan. 8. Your recollection of dates of my telephone call to you is a little off--it was in June that I called you about participation in the Rome meeting.

After talking to you, I proposed a schedule for the session on documentation to Drs. Frankel and Leon, including a contribution from you. This was done on June 7, 1972. In that letter, I suggested (as you had asked me) that funding might be forthcoming from IAEC. They told me in reply that there were no funds available for more than one contributor to this session from the United States. I then asked that they convey this message to you, which apparently they did some time this past fall. I assumed from this that you had not been able to make appropriate arrangements.

I then went ahead with the development of the program, getting speakers who could be fit into the budget available for us.

I am sorry that you were not included, but there apparently were no means by which it could be accomplished.

Sincerely,

Dave

David J. Rogers
Professor of Biology

cc.: Drs. Leon and Frankel

FAO Technical Conference on Crop Genetic Resources (in co-operation with IBP), March 1973.

P.O. Box [illegible]0,
CANBERRA CITY, A.C.T., 2601,
AUSTRALIA.

January 15, 1973.

You may have been informed by the convener of the section in which you have kindly agreed to speak that many of the contributions to the conference are to be included in a book which is to be one of the "synthesis volumes" to be published for the International Biological Programme (IBP) by the Cambridge University Press.

In the context of this series the publication of this volume is to be the concluding effort in a series of activities throughout the 10 years of the IBP. In the area of plant gene pools, the role of IBP has been to collaborate with FAO in the clarification of scientific and methodological issues, the definition of goals and strategies, the preparation of guidelines for national and international participation, the planning and initiation of action programmes, and the dissemination of information at scientific, national and U.N. levels. Participation in the organization of the Technical Conferences in 1967 and 1972, in the Survey of Genetic Resources in the Field (1971/72), in the U.N. Conference on the Human Environment, and the publication of IBP Handbook No. 11 (Genetic Resources in Plants - their Exploration and Conservation) were some of these activities.

Most of the papers to be presented at the conference fall into one or another of the areas of IBP participation. They will indicate the progress which has been made in these 10 years, hence their inclusion in a synthesis volume will be appropriate. Others will be factual reports some of which may lend themselves to presentation as a group, or in the form of extended summaries. As editors we shall be responsible not only for the suitability of contributions in the context of the series, but for the overall length which is restricted to 300 pages by agreement between IBP and the publishers. It may be necessary to modify, reduce or reject some contributions, while giving extended space to scientific fields which had received insufficient attention in Handbook No. 11, and to issues of special practical significance. Population problems, conservation methods, and documentation clearly qualify on both these scores. In some instances we may have to look for additional material if this seems to be necessary in the interests of providing a full coverage of the subject.

Section conveners have no doubt mentioned to you that a full text of your paper is needed by mid-January. Should you find that, in the light of what has taken place at the conference, you need to modify the text of your contribution, we shall be pleased to receive an amended version subsequently. However, I am sure you will understand that for reasons of speed of publication we must impose a 'deadline'. Therefore, we shall not be able to include for publication any material received later than May 1st, 1973.

Authors will, of course, be consulted should any major changes be proposed by the editors, and they will receive the first set of proofs for corrections of errors by the printers. One copy of the book and 50 reprints will be issued free to authors.

We should like to take this opportunity of thanking you for your very kind collaboration in what we hope will be a publication of considerable interest and importance in the field of genetic resources.

Yours sincerely,

O.H. Frankel J.G. Hawkes

Jan 10, 1973

Dear Jorge:

I apologise for my quick response to your letter asking for corrections in the abstracts for the section on documentation at the upcoming technical conference. A letter just arrived from Otto, though dated Dec. 15, and he was much more emphatic than you about the requirements for change. I have, therefore, gone over the abstracts of Snoad and Seidewitz, and the changes are enclosed. I trust that it is not too late.

I hope the enclosed are an improvement, and these will serve your needs better. I should have had a better idea of what was expected from the participants, because I thought there would be an opportunity to modify any part of the presented material in light of any changes that would come from the conference itself. Sorry I did not know.

Sincerely,

David J. Rogers
Professor of Biology

Encl.: Two abstracts by Snoad and Seidewitz

Reference: AGPE - PL 7/10, Dec. 5, 1972.

Jan. 11, 1973

Dear Brian:

Enclosed are a copy of my rewording of your abstract and a copy of a letter from Otto Frankel, which is the stimulus for rewording your abstract. First, Jorge Leon had written in December, asking that I reword your abstract, but I wrote back to him telling him I was satisfied with it. Second, Otto wrote, and his demands are much more impressive than were those of Leon, so I decided to go ahead and rewrite your abstract for their benefit. While I was happy with what you had written, clearly both Leon and Frankel were not, so, to keep them happy, I went ahead.

Please check to see whether anything in the rewritten abstract offends you, is incorrect, or something you do not consider correct.

I have also done the same for Lothar, and a copy is enclosed.

If you have any changes to make, please send them direct to Jorge Leon, with a copy to me.

Don't forget that they want a full text of your paper by Feb. 1.

Sincerely,

David J. Rogers
Professor of Biology

Enclosures.

Jan 11, 1973

Dear Lothar:

Enclosed are a copy of my rewording of your abstract and a copy of a letter from Otto Frankel, which is the stimulus for rewording your abstract. First, Jorge Leon had written in December, asking that I reword your abstract, but I wrote back to him telling him I was satisfied with it. Second, Otto wrote, and his demands are much more impressive than were those of Leon, so I decided to go ahead and rewrite your abstract for their benefit. While I was happy with what you had written, clearly both Leon and Frankel were not, so, to keep them happy, I went ahead.

You will note that I changed the title, again, for Otto's criticism. Please check to see whether anything in the rewritten abstract offends you, is incorrect, or something you do not consider correct. If you have any changes to make, please send them direct to Jorge Leon, with a copy to me.

I have also done the same for Brian Snoad, and a copy of his reworded abstract is enclosed.

Don't forget that they want a full text of your paper by Feb. 1. Please take into consideration changes made in the abstract.

Sincerely,

David J. Rogers
Professor of Biology

Enclosures.

P.S. The original of your reworded abstract has already been sent to Leon.

Jan. 2, 1973

Professor J. G. Hawkes
Department of Botany
University of Birmingham
Birgmingham, England

Dear Jack:

The enclosed letter to Mr. Glendinning explains itself. We are too near the time of completion of the raw data, and their incorporation in the computer system, to put in the Scottish potato data. From Mr. G.'s description of the types of data they are worried about, it does not sound as though they have any quantitatively different types from that already in hand. It seems extraordinarily difficult to explain the information-type problems to people, however, and I doubt that Mr. G. will be fully aware of the nature of the Pilot Project for some time to come, It will, therefore, be a point that I hope you can make to him, and to Simmonds when required. They should not be discouraged before we have done anything!

We will pay particular attention to people's fear of over-specialization of the information retrieval system, both at Pilot Project level and at the presentation in Rome. I recall that you received a letter from our Italian friends which indicated that we should have wheat in the Pilot Project. We will try to show that from the structural point, information for the different crops is the same, although substantively each crop is unique.

The data processing is proceeding well. We are using the facilities of our friends in Mississippi for the actualk processing of the Pilot Project data. I am glad that Henry Fleming had a chance to talk to you on his recent visit in England.

Best wishes for the New Year.

Sincerely,

David J. Rogers
Professor of Biology

Encl.

Jan. 2, 1973

D. R. Glendinning, Esq.,
Scottish Plant Breeding Station
Pentlandfield,
ROSLIN
Midlothian EH25 9RF
Scotland

Dear Mr. Glendinning:

Thank you for sending me a copy of your letter to Professor Hawkes concerning the methods of description and data storage for your collections of potatoes. You will by now, hopefully, received a reply to your letter from Professor Hawkes. Since I have a copy of his letter as well, I am aware of its contents. I believe that he has explained our requirements very well, and I have nothing to add in that direction.

Unfortunately, because of our time schedule, we will not be able to incorporate any data you may have accumulated in the Pilot Project. We will, however, be very pleased to receive the data as a matter of comparison between the types of data which you accumulate with the data accumulated at both Sturgeon Bay and in Lima, at the International Potato Center. Should there be any great differences in the types of data, we will do our very best, at this late stage, to incorporate yours with the others in the Pilot Project. Please do not take this statement as a lack of interest in your data, but recognize that we are working on a very tight budget of both time and money. Should we be successful in the Pilot Project, we trust that there will be an opportunity to continue in the information retrieval aspects on a more regular basis. Your cooperation will be very much appreciated.

Thank you for your very extensive information, and I look forward to later cooperation.

Sincerely yours,

David J. Rogers
Professor of Biology

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99163
DEPARTMENT OF AGRONOMY AND SOILS

February 27, 1973

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Thank you for the materials. I'll do my best to get something ready in time but already know I'll be quite pressed for use of time. The only comments I have so far after reading abstracts is to encourage your colleague Hersh not to be too generous about his comments regarding not "forcing" any procedure or system on anyone. If he speaks of computer processing systems ok, but the approach might be a bit softer and more diplomatic. Certainly we don't want to force anything on anyone, but should do all we can to encourage cooperation and participation in development for mutual benefit. Individualism is ok if it is directed in a way to contribute to common good. Here I'm speaking mainly of the standardization of methods not IR system.

In the latter case there may be plenty of room for trying different systems. I will have my travel but as Otto indicated one time, I hope IBP can cover my per diem at the meeting.

Sincerely,

Cal

C. F. Konzak
Professor

CFK/am

INSTITUT FÜR PFLANZENB[illegible]J UND SAATGUTFORSCHUNG
DER FORSCHUNGSANSTALT FÜR LANDWIRTSCHAFT
BRAUNSCHWEIG-VÖLKENRODE
Direktor: Prof. Dr. D. Bommer

[illegible] BRAUNSCHWEIG, February 22, 1973
Bundesallee 50
Fernruf 5 50 61
Drahtanschrift: Landforschung Braunschweig
Station für Fracht- und Expreßgut:
Bhf. Braunschweig-Lehndorf

Institut Pflanzenbau FAL 33 Braunschweig Bundesallee 50

Unser Zeichen: Sei/Rah
12 - 24/2

Prof. Dr. David J. Rogers
University of Colorado
Dept. of Biology
Boulder/Colorado 80302
U.S.A.

Dear Dave,

Under separate cover a copy of my paper for the FAO/IBP Technical Conference on Plant Genetic Resources was sent to you. I'm very sorry about the delay but I found it necessary to rewrite the paper. This could happen again if you would like me to make some changes in order not to fail to go through with these ideas.

I started discussions for universally using "zero" as we agreed upon in Izmir, i.e. specifying absence of a characteristic and not indicating an information that is missed. Those who are in charge of protecting bred varieties in the Federal Republic of Germany have come so far with their combination of "absence" and minimum expression of a characteristic by means of "1" that the UPOV in Geneva and some organizations of the European Common Market are with them. They pointed out that FAO in 1961 suggested this way of data presentation and they do not seem to be ready for further discussions and changes. Do you know the suggestions made by FAO in 1961?

My paper is mainly referring to our own conception for genebank documentation that has undergone many changes when trying to adapt it to already existing documentation systems or when compromising with people from other genebanks. You may now understand the reason for the title of my paper I had before.

You are kindly asked to give your comments to our wheat thesaurus that will reach you under separate cover as a printed matter. The barley thesaurus will follow within a few days.

With best regards,
sincerely yours,

Lothar

(L. Seidewitz)

February 22,1973

Dr. C. F. Konzak
Department of Agronomy & Soils
Washington State University
Pullman, Washington 99163

Dear Cal,

Enclosed are the abstracts of papers of the Symposium on Documentation.

Sincerely,

David J. Rogers

DJR/cr

February 22, 1973

Dr. B. Snoad
Department of Applied Genetics
John Innes Institue
Coloney Lane, Norwich, NOR 70F
England

Dear Brian,

I have received the illustration (flow chart). Konzak will be joining us and a copy of his abstract is enclosed.

Sincerely,

David J. Rogers

DJR/CR

UNIVERSITY OF COLORADO

BOULDER, COLORADO 80302

DEPARTMENT OF BIOLOGY

February 22, 1973

copy

Dr. Lothar Seidewitz
Institut Pflanzenbau FAL
33 Braunschweig
Bundesallee 50
West Germany

Dear Lothar:

I've received your contribution to the conference. It looks all right. Konzak will be joining us and a copy of his abstract is enclosed.

Sincerely,

David J. Rogers

DJR/ CR

TAXIMETRICS LABORATORY
DEPARTMENT OF BIOLOGY
UNIVERSITY OF COLORADO
BOULDER, COLORADO 80302
DIALE 114-(303) 443-2211 X 8508

Feb. 21

Dear Otto:

Belatedly and briefly:

1) Konzak sent me an abstract, and apparently has found funds to attend. I have acknowledged, and put him into the program following seidimity.

2) Your critique of my paper arrived, and I was in the midst of reply when I was struck with the "London" flu - and today is my first day back. I understand your penetrating comments - there are many places for improvement.

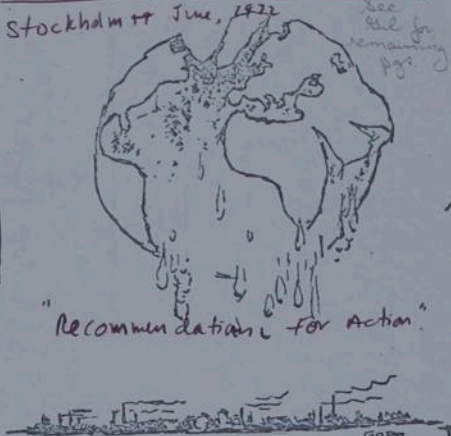
Because of the pass of time, other duties, and sickness, I trust you will not insist on a revision before the Conference - I could not comply. But I assure you that there will be changes in keeping with your recommendations.

I fear that I did not make clear my concept of "management" - it does not apply to the Directors, nor their prerogatives, but really, what do you do with data - you will have to bear me out on this, since all my experience in this field tells me of the importance of the concept.

Sincerely, Dane

UN Conference on the Environment

Stockholm 1972



areas:

i Survey of genetic resources;

ii Inventory of collections;

iii Exploration and collecting;

iv Documentation;

v Evaluation and utilization;

vi Conservation, which represents the crucial element to which all other programmes relate;

e) Although the international programme relates to all types of genetic resources, the action required for each resource will vary according to existing needs and activities.

40. *It is recommended* that Governments, in co-operation with the Secretary-General and FAO where indicated, make inventories of the genetic resources most endangered by depletion or extinction:

a) All species threatened by man's development should be included in such inventories;

b) Special attention should be given to locating in this field those areas of natural genetic diversity that are disappearing;

c) These inventories should be reviewed periodically and brought up to date by appropriate monitoring;

d) The survey conducted by FAO in collaboration with the International Biological Programme is designed to provide information on endangered crop genetic resources by 1972, but will require extension and follow-up.

41. *It is recommended* that Governments, in co-operation with the Secretary-General and FAO where indicated, compile or extend, as necessary, registers of existing collections of genetic resources:

a) Such registers should identify which breeding and experiment stations, research institutions and universities maintain which collections;

b) Major gaps in existing collections should be identified where material is in danger of being lost;

c) These inventories of collections should be transformed for computer handling and made available to all potential users;

d) In respect of plants:

i It would be expected that the "advanced varieties" would be well represented, but that primitive materials would be found to be scarce and require subsequent action;

ii The action already initiated by FAO, several national institutions, and international foundations should be supported and expanded.

e) In respect of micro-organisms, it is recommended that each nation develop comprehensive inventories of culture collections:

i A cataloguing of the large and small collections and the value of their holdings is required, rather than a listing of individual strains;

ii Many very small but unique collections, sometimes the works of a single specialist, are lost;

iii Governments should make sure that valuable gene pools held by individuals or small institutes are also held in national or regional collections.

f) In respect of animal germ plasm, it is recommended that FAO establish a continuing mechanism to assess and maintain catalogues of the characteristics of domestic animal breeds types and varieties in all nations of the world. Likewise, FAO should establish such lists where required.

g) In respect of aquatic organisms, it is recommended that FAO compile a catalogue of genetic resources of cultivated species and promote intensive studies on the methods of preservation and storage of genetic material.

42. *It is recommended* that Governments, in co-operation with the Secretary-General and FAO where indicated, initiate immediately, in co-operation with all interested parties, programmes of exploration and collection wherever endangered species have been identified which are not included in existing collections:

a) An emergency programme, with the co-operation of the Man and the Biosphere Programme, of plant exploration and collection should be launched on the basis of the FAO List of Emergency Situations for a five-year period.

b) With regard to forestry species, in addition to the efforts of the Danish/FAO Forest Tree Seed Centre, the International Union of Forestry Research Organizations, and the FAO Panel of Experts on Forest Gene Resources, support is needed for missions planned for Latin America, West Africa, the East Indies and India.

43. *It is recommended* that Governments, in co-operation with the Secretary-General and FAO where indicated:

1. Recognize that conservation is a most crucial part of any genetic resources programme. Moreover, major types of genetic resources must be treated separately because:

a) They are each subject to different programmes and priorities;

b) They serve different uses and purposes;

c) They require different expertise, techniques and facilities;

2. In respect of plant germ plasma (agriculture and forestry), organize and equip national or regional genetic resources conservation centres:

a) Such centres as the National Seed Storage Laboratory in the USA and the Vavilov Institute of Plant Industry in the USSR already provide good examples;

b) Working collections should be established separately from the basic collections; these will usually be located at plant and breeding stations and will be widely distributed;

c) Three classes of genetic crop resources must be conserved:

i High-producing varieties in current use and those they have superseded;

ii Primitive varieties of traditional pre-scientific agriculture (recognized as genetic treasuries for plant improvement);

iii Mutations induced by radiation or chemical means;

d) Species contributing to environmental improvement, such as sedge used to stabilize sand-dunes, should be conserved;

e) Wild or weed relatives of crop species and those wild species of actual or potential use in rangelands, industry, new crops, etc. should be included;

3. In respect of plant germ plasma (agriculture and forestry), maintain gene pools of wild plant species within their natural communities. Therefore:

a) It is essential that primeval forests, bushlands and grasslands which contain important forest genetic resources be identified and protected by appropriate technical and legal means; systems of reserves exist in most countries, but a strengthening of international understanding on methods of protection and on availability of material may be desired;

b) Conservation of species of medical, aesthetic or research value should be assured;

c) The network of biological reserves proposed by UNESCO (MAB) should be designed, where feasible, to protect these natural communities;

d) Where protection in nature becomes uncertain or impossible, then means such as seed storage or living collections in provenance trials or botanic gardens must be adopted;

4. Fully implement the programmes initiated by the FAO panels of experts on forest gene resources in 1968 and on plant exploration and introduction in 1970;

5. In respect of animal germ plasma, consider the desirability and feasibility of international action to preserve breeds or varieties of animals:

a) Because such an endeavour would constitute a major effort beyond the scope of any one nation, FAO would be the logical executor of such a project. Close co-operation with Governments would be necessary, however. The International Union for Conservation of Nature and Natural Resources might, logically, be given responsibility for wild species, in co-operation with FAO, the Man and the Biosphere Programme (UNESCO), and Governments.

b) Any such effort should also include research on methods of preserving, storing, and transporting germ plasm;

c) Specific methods for the maintenance of gene pools of aquatic species should be developed;

d) The recommendations of the FAO Working Party Meeting on Genetic Selection and Conservation of Genetic Resources of Fish, held in 1971, should be implemented;

6. In respect of micro-organism germ plasm, co-operatively establish and properly fund a few large regional collections:

a) Full use should be made of major collections now in existence;

b) In order to provide geographical distribution and access to the developing nations, regional centres should be established in Africa, Asia and Latin America and the existing centres in the developed world should be strengthened;

7. Establish conservation centres of insect germ plasm. The very difficult and long process of selecting or breeding insects conducive to biological control programmes can begin only in this manner.

44. *It is recommended* that Governments, in co-operation with the Secretary-General and FAO where indicated, recognize that evaluation and utilization are critical corollaries to the conservation of genetic resources. In respect of crop-breeding programmes, it is recommended that Governments give special emphasis to:

a) The quality of varieties and breeds and the potential for increased yields;

b) The ecological conditions to which the species are adapted;

c) The resistance to diseases, pests and other adverse factors;

d) The need for a multiplicity of efforts so as to increase the chances of success.

45. *It is recommended* that Governments, in co-operation with the Secretary-General of the United Nations and the FAO where indicated:

1. Collaborate to establish a global network of national and regional institutes relating to genetic resource conservation based on agreements on the availability of material and information on methods, on technical standards, and on the need for technical and financial assistance wherever required;

a) Facilities should be designed to ensure the use of the materials and information: i) by breeders, to develop varieties and breeds both giving higher yields and having higher resistance to local pests and diseases and other adverse factors; and ii) by users providing facilities and advice for the safest and most profitable utilization of varieties and breeds most adapted to local conditions;

b) Such co-operation would apply to all genetic resource conservation centres and to all types mentioned in the foregoing recommendations;

c) Standardized storage and retrieval facilities for the exchange of information and genetic material should be developed:

i Information should be made generally available and its exchange facilitated through agreement on methods and technical standards;

ii International standards and regulations for the shipment of materials should be agreed upon;

iii Basic collections and data banks should be replicated in at least two distinct sites, and should remain a national responsibility;

iv A standardized and computerized system of documentation is required;

d) Technical and financial assistance should be provided where required; areas of genetic diversity are most frequently located in those countries most poorly equipped to institute the necessary programmes;

2. Recognize that the need for liaison among the parties participating in the global system of genetic resources conservation requires certain institutional innovations. *To this end:*

a) It is recommended that the appropriate UN agency establish an international liaison unit for plant genetic resources in order:

i To improve liaison between governmental and non-governmental efforts;

ii To assist in the liaison and co-operation between national and regional centres, with special emphasis on international agreements on methodology and standards of conservation of

standardization and co-ordination of computerized record systems, and the exchange of information and material between such centres;

iii To assist in implementing training courses in exploration, conservation and breeding methods and techniques;

iv To act as a central repository for copies of computerized information on gene pools (discs and tapes);

v To provide the secretariat for periodic meetings of international panels and seminars on the subject; a conference on germ plasm conservation might be convened to follow up the successful conference of 1967;

vi To plan and co-ordinate the five-year emergency programme on the conservation of endangered species;

vii To assist Governments further, wherever required, in implementing their national programmes;

viii To promote the evaluation and utilization of genetic resources at the national and international levels;

b) It is recommended that the appropriate UN agency initiate the required programme on micro-organism germ plasm:

i Periodic international conferences involving those concerned with the maintenance of and research on gene pools of micro-organisms should be supported;

ii Such a programme might interact with the proposed regional culture centres by assuring that each centre places high priority on the training of scientists and technicians from the developing nations, acting as a necessary liaison; and lending financial assistance to those countries established outside the developed countries;

iii The international exchange of pure collections of micro-organisms between the major collections of the world has operated for many years and requires little re-enforcement;

iv Study should be conducted particularly on waste disposal and recycling, controlling diseases and pests, and food technology and nutrition;

c) It is recommended that the FAO institute a programme in respect of animal germ plasm to assess and maintain catalogues of the economic characteristics of domestic animal breeds and types and of wild species and to establish gene pools of potentially useful types;

d) It is recommended that the Man and the Biosphere project on the conservation of natural areas and the genetic material contained therein should be adequately supported.

46. *It is recommended* that Governments and the Secretary-General in co-operation with the FAO and other UN organizations concerned, as well as development assistance agencies, take steps to support recent guidelines, recommendations and programmes of the various international fishing organizations. A large part of the needed international action has been identified with action programmes initiated by FAO and its Intergovernmental Committee on Fisheries and approximately 24 other bilateral and multilateral international commissions, councils and committees. In particular these organizations are planning and undertaking:

a) Co-operative programmes such as that of LEPOR (Long-Term and Expanded Programme of Oceanic Research), GIPME (Global Investigation of Pollution in the Marine Environment) and IBP (International Biological Programme);

b) Exchange of data, supplementing and expanding the services maintained by FAO and bodies within its framework in compiling, disseminating and co-ordinating information on living aquatic resources and their environment and fisheries activities;

c) Evaluation and monitoring of world fishery resources, environmental conditions, stock assessment, including statistics on catch and effort, and the economics of fisheries;

d) Assistance to [illegible] in interpreting the implications of such assessments, identifying alternative management measures, and formulating required actions;

e) Special programmes and recommendations for management of stocks of fish and other aquatic animals proposed by the existing international fishery bodies. Damage to fish stocks has often occurred because regulatory action is taken too slowly. In the past, the need for management action to be nearly unanimous has reduced action to the minimum acceptable level.

47. *It is recommended* that Governments, and the Secretary-General in co-operation with FAO and other UN organizations concerned, as well as development assistance agencies, take steps to ensure close participation of fishery agencies and interests in the preparations for the United Nations Conference on the Law of the Sea. In order to safeguard the marine environment and its resources through the development of effective and workable principles and laws, the information and insight of international and regional fishery bodies, as well as the national fishery agencies are essential.

48. *It is recommended* that Governments, and the Secretary-General in co-operation with the FAO and other UN organizations concerned, as well as development assistance agencies, take steps to ensure international co-operation in the research, control and regulation of the side effects of national activities in resource utilization where these affect the aquatic resources of other nations:

a) Estuaries, intertidal marshes, and other near-shore and in-shore environments play a crucial role in the maintenance of several marine fish stocks. Similar problems exist in those fresh water fisheries that occur in shared waters;

b) Discharge of toxic chemicals, heavy metals, and other wastes may affect even high-seas resources;

c) Certain exotic species, notably the carp, lamprey and alewife, have invaded international waters with deleterious effects as a result of unregulated unilateral action.

49. *It is recommended* that Governments, and the Secretary-General in co-operation with FAO and other UN organizations concerned, as well as development assistance agencies, take steps to develop further and strengthen facilities for collecting, analysing and disseminating data on living aquatic resources and the environment in which they live;

a) Data already exist concerning the total harvest from the oceans and from certain regions in respect of individual fish stocks, their quantity, and the fishing efforts expended on them, and in respect of their population structure, distribution and changes. This coverage needs to be improved and extended;

b) It is clear that a much greater range [illegible] monitored and analysed in order to provide an adequate basis for evaluating the interaction of stocks and managing the combined resources of many stocks. There is no institutional constraint on this expansion but a substantial increase in funding is needed by FAO and other international organizations concerned to meet this expanding need for data;

c) Full utilization of present and expanded data facilities is dependent on the co-operation of Governments in developing local and regional data networks, making existing data available to FAO and to the international bodies, and formalizing the links between national and international agencies responsible for monitoring and evaluating fishery resources.

50. *It is recommended* that Governments, and the Secretary-General in co-operation with the FAO and other UN organizations concerned, as well as development assistance agencies, take steps to ensure full co-operation among Governments by strengthening the existing international and regional machinery for development and management of fisheries and their related environmental aspects and, in those regions where these do not exist, to encourage the establishment of fishery councils and commissions as appropriate.

a) The operational efficiency of these bodies will depend largely on the ability of the participating countries to carry out their share of the activities and programmes;

b) Technical support and servicing from the specialized agencies, in particular from FAO, is also required;

c) The assistance of bilateral and international funding agencies will be needed to ensure the full participation of the developing countries in these activities.

51. *It is recommended* that Governments concerned consider the creation of river-basin commissions or other appropriate machinery for co-operation between interested States for water resources common to more than one jurisdiction.

a) In accordance with the Charter of the UN and the principles of international law, full consideration must be given to the right of permanent sovereignty of each country concerned to develop its own resources;

b) The following principles should be considered by the States concerned when appropriate:

i Nations agree that when major water resource activities are contemplated that may have a significant environmental effect on another country, the other country should be notified well in advance of the activity envisaged;

ii The basic objective of all water resource use and development activities from the environmental point of view is to ensure the best use of water and to avoid its pollution in each country;

iii The net benefits of hydrologic regions common [illegible] jurisdiction are to be shared equitably by the nations affected;

c) Such arrangements, when deemed appropriate by the States concerned, will permit undertaking on a regional basis:

i Collection, analysis, and exchanges of hydrologic data through some international mechanism agreed upon by the States concerned;

ii Joint data-collection programmes to serve planning needs;

ii Assessment of environmental effects of existing water uses;

iv Joint study of the causes and symptoms of problems related to water resources, taking into account the technical, economic, and social considerations of water quality control;

v Rational use, including a programme of quality control, of the water resource as an environmental asset;

vi Provision for the judicial and administrative protection of water rights and claims;

vii Prevention and settlement of disputes with reference to the management and conservation of water resources;

viii Financial and technical co-operation of a shared resource;

d) Regional conferences should be organized to promote the above considerations.

52. *It is recommended* that the Secretary-General take steps to ensure that appropriate UN bodies support government action where required:

1. Reference is made to FAO, WHO, WMO, ESA—RTD, UNESCO/IHD, UNESOB. For example:

a) FAO has established a Commission on Land and Water Use for the Middle East which promotes regional co-operation in research, training and formation, *inter alia* on water management problems;

b) WHO has available the International Reference Centre for Waste Disposal located at Dübendorf, Switzerland, and the International Reference Centre on Community Water Supply in the Netherlands;

c) WMO has a Commission on Hydrology which provides guidance on data collection and on the establishment of hydrological networks;

d) Resources and Transport Division of ESA has the UN Water Resources Development Centre;

e) UNESCO is sponsoring the International Hydrological Decade programme of co-ordinated research on the quality and quantity of world water resources.

2. Similar specialized centres should be established at the regional level in developing countries for training research and information exchange on:

a) Inland water pollution and waste disposal in co-operation with WHO, FAO, the UN regional economic commissions and UNESOB;

b) Water management for rain-fed and irrigated agriculture, by FAO in co-operation with the regional economic commissions and UNESOB;

c) Integrated water resources planning and management in co-operation with ESA—RTD, the regional economic commissions, and UNESOB.

53. *It is recommended* that the Secretary-General take steps to ensure that the United Nations system is prepared to provide technical and financial assistance to Governments when requested in the different functions of water resources management:

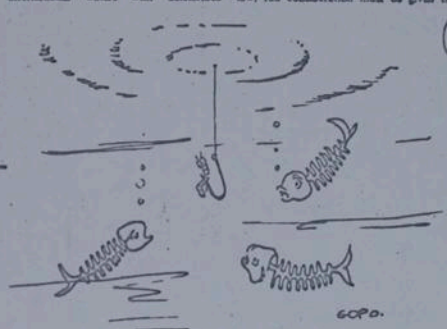
a) Surveys and inventories;

b) Water resources administration and policies, including:

i The establishment of institutional frameworks;

ii Economic structures of water resources management and development;

iii Water resources law and legislation;



1)

Dear Otto:

From your letter of the 8th Feb., I am somewhat confused, and think there must be something else you're trying to tell me, between the lines. First, I understand you want a more technical paper. This problem arises because (a) you have not yet seen Hersh's paper, which has technical detail in it, and (b) we were planning to demonstrate, at the conference, but not during the formal sessions, what we have done in the Pilot Project. Another very great source of confusion to us is the difference between the presentation at the conference, and the presentation in the final, written paper for the book.

We have had more experience in dealing with working scientists on their problems of documentation than you give us credit for, and know what they can, and cannot assimilate. We know, for example, that we cannot begin operation of either individual centers or networks of centers with some completely esoteric documentation system completely unfamiliar to the people who will eventually staff their centers. We must begin with those documentations with which the workers are familiar, then use their data as they presnetly structure it. At the core of our operating philosophy is a system, ENVIR, which we have demonstrated can indeed deal with information in any format, with conversion routines. We believe that, after the scientist sees ENVIR in operation, they will then be more ready to modify their operating procedures to use the full capability of the system. Also, at the core of our philosophy is that we cannot dictate to the working scientist what he will or will not do. The failure of dictatorial procedures should be quite evident to you. Another problem you and I have with respect to communications is what we mean by management--I

think that you think that I am stepping on the toes of the international group of scientists who are indeed the managers, or more precisely, the directors of the activities of genetic resource centers. My use of the word management is directed precisely at the information, and its effective handling, so that it can meet the requirements of the directors. Again, we have a core system, ENVIR, with which to begin this management, but until the directors tell us what they want, we cannot proceed. You mentioned that (paragraph 3) I have included what seems to you obvious and trivial operations, but further down you urge me to "confine yourself to a few examples of inputs requiring documentation....." and that is exactly what I did--I chose a few examples of inputs requiring documentation. Documentation exists whether you are talking about a "conservation" stream or "multiplication and distribution" one, whether they be "conservation centers" or "working collection centers". And this is precisely why information management is at the core of the problem. For some reason, it seems that most scientiests do not see that there is no qualitative or quantitative difference in the types of information in any one of the above quoted types of centers, and that in all cases, trivial or nontrivial, the data must be gathered according to some format, stored in some manner, and retrieved in some manner.

Now, to what seems to me the most sensitive part of our discussions, and one where I want you to know that I do not want to pre-empt your prerogatives at all--rather I want to support your concept of the international network. In reading the resolutions of the Stockholm conference, we note that it reads that a standardized, computerized, system will be employed for documentation. From that resolution to the actual working system is a long way,

and many steps are involved. We have a xxxxxx a set of computer programs in ENVIR which (by demonstration) can do the job we need, but the most important feature is how we organize the whole operation so that information flows into the system, when, where, and how we want it that becomes the most critical element.

The technical details of the documentation methods for an international network cannot be specified until such time as there has been a decision to have an international network. What constitutes an international network? It seems to me that such a network is a communication system, with documentation as the means by which you make the communication, but until the directors of an international network decide what they want that network to do, there is absolutely no way to set up the information system for it. Given the okay to establish an international system, we will have to know how much money is available for the documentation system in order to specify the kinds of operations which can be established. If the funds are very limited, we may have to establish one computing center for all the centers in the network, and then use hand-punched or typewritten data formats at the individual centers. You see, we cannot establish ENVIR until we know where, what kind of machine, and the operating characteristics of that machine.

For the several reasons given in this letter, I do not wish to get overly technical in the discussion. However, we will demonstrate the technical capacity of ENVIR at demonstrations, outside of the formal symposium presentations, for any or all the participants, even if we have to put on a demonstration every night of the week.

Now, when we get to Rome, it would seem time for you and I

to precisely define the conten ts of the chapters in the books. But we are into such a complex subject with documentation that we need your advice as to what to include and what to exclude.

I have had the experience over and over again that people delight in misinterpreting what is said at a conference. The best example I can think of is Lothar Albrecht, who reported back to you after the Birmingham workshop, and who almost totally misrepresented the system, even after hearing me speak about it. This led me to the concept of putting on the demonstration, where the results of the system operation could be judged for effectiveness, rather than to try to wave my hands, or again describe the functions of the system, as I did both at Izmir and in Birmingham.

Feb. 21, 1973

Dear Cal:

Yours of the 14th just in. Now that your arrangements have been made, I have scheduled your contribution to follow that of Lothar Seidiwitz. The sequence will be Snoad, Seidiwitz, yours, Hersh, and finally, mine. I will give a short introduction to the symposium, to show the relationships between each of the papers and the final, overall objective. This is a "directed" symposium, in the sense that we all contribute a piece to the overall picture of documentation in genetic resource centers, to indicate that for the documentation function in those centers, we are ready to go when the international organization is ready.

A copy of Otto's instructions on the preparation of the paper for publication is enclosed.

Your abstract shows that your contribution will fit nicely into the overall structure as we envisioned it. We must indicate a community of purpose, with no statitic in the system.

Sincerely,

David J. Rogers

Encl.

Feb. 21, 1973

Dear Cal:

Yours of the 14th just in. Now that your arrangements have been made, I have scheduled your contribution to follow that of Lothar Seidiwitz. The sequence will be Snoad, Seidiwitz, yours, Hersh, and finally, mine. I will give a short introduction to the symposium, to show the relationships between each of the papers and the final, overall objective. This is a "directed" symposium, in the sense that we all contribute a piece to the overall picture of documentation in genetic resource centers, to indicate that for the documentation function in those centers, we are ready to go when the international organization is ready.

A copy of Otto's instructions on the preparation of the paper for publication is enclosed.

Your abstract shows that your contribution will fit nicely into the overall structure as we envisioned it. We must indicate a community of purpose, with no statitic in the system.

Sincerely,

David J. Rogers

Encl.

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99163

DEPARTMENT OF AGRONOMY AND SOILS

February 14, 1973

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Enclosed is a quickly prepared abstract of what I hope to cover in the 20 minutes allotted. I have now received a request from Vienna to serve as a consultant there after the meetings in Rome. My request for approval by the University was submitted today also. I am looking forward to seeing you and others and to discuss ideas and approaches to this very important endeavor.

Sincerely,

Carl

C. F. Konzak
Professor

CFK/ma
Enc: 1
CC: O. Frankel
J. Leon
A. Micke

CSIRO

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600, CANBERRA CITY, A.C.T. 2601 TELEPHONE 48 7722 TELEGRAMS PLANTINDUSTRY CANBERRA TELEX 62351

OHF:CFS
Ref:

AIR MAIL

8th February, 1973.

Professor D.J. Rogers,
Professor of Biology,
University of Colorado,
BOULDER, COLORADO 80302.

Dear Dave,

Thank you for the MS. of your paper. My impression is that it is a good introductory paper, provided more detailed technical meat were to follow. You must bear in mind that your audience - and the readers of the book - have a good deal of background on the generalities of the subject, but are looking for discussion and guidance of a technical nature. Certainly you are giving some: but is it enough?

Perhaps we have to distinguish between the presentation at the Conference and in the book. At the Conference something like the present paper up to the sub-heading on p.7 would seem appropriate as an introductory statement, especially were you to introduce all contributions and not only Snoad's, and also your final one. This would put the entire section in perspective. I think this introductory paper could be a little abbreviated - after all most people can be expected to know something of the purposes of documentation.

The second part should, I think, be put on a more technical basis, which would give a good deal more to those who know something about the workings of computers. This is what most people would expect and would want you to do. In introducing your concept of "information management systems" you seem to place much more emphasis on "management" than on "information". This is apparent from the great deal of detail of "functions" of a centre - the only detailed discussion in the whole paper - which to me seems both unnecessary and perhaps unwise since it includes obvious and trivial operations, yet leaves out crucial ones such as the separation of a "conservation" stream from a "multiplication and distribution" one. Anyway, this entire subject must be dealt with, and thoroughly discussed, in my paper on genetic resources centres! You are probably not aware of the many things that have been said and written about this subject, ever since the 4th meeting of the FAO Panel which, on John Creech's initiative, did good work in defining the functions of genetic resources centres and particularly the distinction between "conservation centres" (such as Fort Collins, Hiratsuka, or Braunschweig, and "working collection centres", although the two may be combined in one institution, or there may be intergrades. I shall be discussing all this in detail. I think for your purpose it would suffice to confine yourself to a few examples of inputs requiring documentation, so as to avoid the perennial argument as to what should be included, and how. I think at this stage you should become thoroughly technical and go into the "hows" rather than the "whats".

Now coming to the network documentation problems, I think you should also be much more technical and specific. What you say is very useful and needs to be said; but one would like to have some kind of blueprint for a global documentation network, including "peripheral" and developed documentation centres, their mutual relations including computer absorption of the formers' information, and the inter-center links which might be developed, and how. It is quite useful that you consider costs, and show that low-cost participation is possible and efficient, can provide all that an individual centre may require, and can link in with a major network. I think your treatment should be both technical and visionary. After all, this Conference is to show the way to the future, and should be inspiring and courageous!

To sum up, I think the first part of the paper (minus the first paragraph which repeats what will have been said repeatedly) would be a very good introductory statement, somewhat abbreviated, and with some few words about the other papers. The second part should be your major contribution and very much built up. You have to judge, however, in the light of the other papers, whether it would not be best to have the whole as the first paper. This will depend on what the other papers are like, especially Hersh's of which I know nothing, and whether there is to be discussion after each paper or a single one. If the latter, your main paper should surely be the last.

I hope these comments do not rock you too much. Unfortunately I have no opportunity to confer with my fellow editor, Jack Hawkes, but I am pretty sure he will support me as far as the book is concerned. The Conference, with its close timing, imposes limitations. But while you would not be able to present the entire paper that I am suggesting, I still feel you could present a good deal more meat at the expense of a good deal that many people would know anyway. I am sending copies to Jack and Jorge.

Yours ever,

OHo

(O.H. Frankel)

DIVISION OF PLANT INDUSTRY
P.O. BOX 1600, CANBERRA CITY, A.C.T. 2601 TELEPHONE 48 7722 TELEGRAMS PLANTINDUSTRY CANBERRA

OHF:CFS
Ref:

5 February, 1973.

Dr. D.J. Rogers,
Professor of Biology,
University of Colorado,
BOULDER, COLORADO 80302, U.S.A.

Dear Dave,

Thank you for your letter of January 29 and copy of your letter to Cal - very good. I doubt that he will get funds, and he is making a storm in a teacup. However, if he does succeed in attending, your suggestions are appropriate.

Regarding Snoad we are in complete agreement. By the way, I did not receive your comments to him nor the re-drafted abstract, they must have gone astray. As you describe it it sounds O.K., as does the arrangement of the symposium, with an introduction and/or longer recapitulation by yourself.

Best regards.

Yours sincerely,

OHF

(O.H. Frankel)

JOHN INNES INSTITUTE
COLNEY LANE, NORWICH, NOR 70F
Norwich 52571

BS/td

8th February, 1973.

Professor D. J. Rogers,
University of Colorado,
Boulder, Colorado,
803020 U.S.A.

Dear Dave,

Here is a rough idea of the flow chart which I am having prepared for the Rome meeting next month. I have deliberately kept it as simple as possible but even so I hope that it does cover the main documentation requirements of a G.R.C. I thought to put up just this one slide before the final paragraph of the talk. I hope, by the way, that you did receive the draft which I sent you two or three weeks ago.

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

AIR
Enc.

Feb. 2, 1973

Dear Otto and Jorge:

Enclosed is my mss for the Conference. I have not included anything but the text, and still have to add the figures and the references, plus a short appendix (1 page). Hersh will have his paper coming along shortly, but he's been sick, and that delayed matters.

Any editing you care to do is welcome.

Please tell me about financing the trip. Do I pick up the costs and then bill you, or do you get better air fare by buying through FAO?

You should have received Snoad's paper by now. I have received a copy, and am not too happy about it. There should be some adjustments.

Sincerely,

David J. Rogers

Feb. 2, 1973

Dear Otto and Jorge:

Enclosed is my mss for the Conference. I have not included anything but the text, and still have to add the figures and the references, plus a short appendix (1 page). Hersh will have his paper coming along shortly, but he's been sick, and that delayed matters.

Any editing you care to do is welcome.

Please tell me about financing the trip. Do I pick up the costs and then bill you, or do you get better air fare by buying through FAO?

You should have received Snoad's paper by now. I have received a copy, and am not too happy about it. There should be some adjustments.

Sincerely,

David J. Rogers

Feb. 2, 1973

Dear Otto and Jorge:

Enclosed is my mss for the Conference. I have not included anything but the text, and still have to add the figures and the references, plus a short appendix (1 page). Hersh will have his paper coming along shortly, but he's been sick, and that delayed matters.

Any editing you care to do is welcome.

Please tell me about financing the trip. Do I pick up the costs and then bill you, or do you get better air fare by buying through FAO?

You should have received Snoad's paper by now. I have received a copy, and am not too happy about it. There should be some adjustments.

Sincerely,

David J. Rogers

OHF:CFS
Ref:

1st February, 1973

Professor C.F. Konzak,
Department of Agronomy and Soils,
Washington State University,
PULLMAN, WASHINGTON 99163, U.S.A.

Dear Cal,

I am distressed at your correspondence with Dave Rogers, and the misunderstandings which have arisen. Let me make the situation quite clear.

1. Finance for your attendance. Dave has no responsibility for this at all. Jorge discussed this matter with Sig, with negative result. Further, IAEA has nothing whatever to do with funding anyone, from U.S. or elsewhere, to attend the Conference. You were the only one in question, on a purely personal basis. The funding for "one only from the U.S." refers to funding from Conference resources, not IAEA. You misunderstood Dave's letter.

2. Scientific programme. This is Dave's responsibility, as organizer of this section. Hence, should you secure funds which make your attendance possible, you should discuss the nature and length of your contribution with him. This was the meaning of my last letter. As I understand his letter to you, he simply wants to explain that you were not included in the programme because there was no prospect of travel funds; of this I had made you aware a long time ago. Should you now be able to secure funds yourself, the programme will have to be recast to provide time for your paper.

Yours sincerely,

(O.H. Frankel)

Professor D.J. Rogers,
Professor of Biology,
University of Colorado,
BOULDER, COLORADO 80302.

Referred for your information.

(O.H. Frankel)

...e – please do settle this with Cal: he seems upset. I think all you need do is to write ... will be welcome – would he let you have the ... [illegible] OHF

Jan. 29, 1973

Dear Kal:

Otto has just sent a letter saying ok to adding your presentation to the Technical Conferance, Section 7, Documentation. That clears up part of point 3 in my letter to you 3 days ago--its okay to go ahead.

So, why don't you put into your paper something that will fit with the general thrust of the papers we're giving, with the general theme of your paper to be the most critical gene bank data. What we are attempting to do is give an overall picture of the functions of documentation in genetic resource centers, from the initial point of collection through each of the stages. Yours would be the area of your greatest expertise--what are the critical data for each of the stages, no matter which crop is involved.

As you know, the time is late, so perhaps you can quickly prepare an abstract, and sent the original to Jorge, and the copy to me. The abstract should not be more than 500 words. The paper should be about 15 to 20 minutes, no more, because we hope that we will generate lots of discussion, and the more time for that the better.

Let me know as soon as you can of the success you have with travel support. It will be necessary to make a few adjustments in the other presentations to fit your in.

Sincerely,

David J. Rogers
Professor of Biology

Jan. 29, 1973

Sir Otto Frankel
CSIRO
Canberra City, A.C.T.

Dear Otto:

Yours of 23rd Jan. just in. I have complied with your suggestion to go ahead with an invitation to Cal. I hope this problem is cleared up now, but knowing Cal, I doubt that it is. A copy of my letter to him is enclosed.

I am disappointed in Snoad's contribution, and am a little surprised at it. You saw my set of suggestions to him, and you should have received by now a new abstract which I rewrote for him. I think, however, that it will all straighten out before the conference, and certainly before final submission of manuscript for the book.

My initial design for the documentation section was that there would be a very short review of the previous work done in documentation--certainly not a full history of the efforts made over the last 6-7 years. All that Snoad was supposed to do was pull the first stages of the concept of documentation together, and to use his own experience with Pisum as an illustrative example. Then the other papers will be sufficient emphases on various critical aspects of documentation, and mine to be the summarization of it all.

Now, in the symposium itself, I will introduce the topic, but will not, in the introduction, give the whole paper which I want to be a recapitulation, and final overall survey of where we stand. This strikes me as most appropriate as the last in line. I expect that this part of the whole conference will draw some of the most active discussion, and I want to be sure to set the stage for this discussion, just before we open it up to the audience for participation.

Will the above be a satisfactory organization? Hope it makes it--your input (if I may use the jargon) has been definitely beneficial to sharpening things up.

Sincerely,

David J. Rogers
Professor of Biology

Jan. 26, 1973

Dr. C.F. Konzak
Dept. of Agronomy and Soils
Washington State University
Pullman, Washington 99168

Dear Cal:

In response to yours of the 22nd, the only comments I can make are as follows:

1. On June 7, I submitted a preliminary list of speakers to Otto, including you as one of them. I also, in that letter, conveyed to Otto and Jorge that you could possibly get travel funds from the IAEA, if they would make the application, and in a reply of 27 June, Otto told me that there was nothing he could do to apply for funds from IAEA for you, since Jorge had already contacted Sigurbjörnson, who told Jorge that unless you could come in connection with your sabbatical, there was no support. I assumed from this that you would have communicated with Sigurbjörnson, which is justifiable, and certainly not for me to do. If Otto and Jorge chose not to inform you of the Vienna decision, I cannot see where I could have done anything additionally.

2. Jorge and Otto are responsible for the financial arrangements for the conference. I merely organized the section on documentation, with clearly no financial responsiblity. I was informed that funds were most needed to bring people from developing countries to the conference, and that they could support only one speaker from the western US. This, plus the considerations in number 1 above, made it necessary to revise the preliminary list of speakers, excluding your contribution.

3. If you can get the Vienna people to support your travel, I believe that we could find a small time segment on the program, although at this date, I would have to get the permission from Otto to do so. If you want, I can say this in a letter to the IAEA, as an aide in your application to them for support.

Sincerely,

David J. Rogers
Professor of Biology

CSIRO AIR MAIL

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600, CANBERRA CITY, A.C.T. 2601 TELEPHONE 48 7722 TELEGRAMS PLANTINDUSTRY CANBERRA TELEX 62351

OHF:DMcC
Ref:

23rd January, 1973.

Professor D.J. Rogers,
Professor of Biology,
University of Colorado,
BOULDER. COLORADO. 80302.

Dear Dave,

... I have had a reply from Cal Konzak - copy enclosed. I doubt that he will obtain the necessary finance; but in case he does, he should be advised on the kind of paper that would be useful to the session. This of course is your responsibility and I should be grateful if you would write to him forthwith. I have warned him in my last letter, of which I sent you a copy, that the time allocation would be brief.

I hope that you will have removed the misunderstanding with Brian Snoad; I can not quite understand why you asked him to give an introductory paper - I understood at Izmir that you would give the first paper, which would set out the objectives and problems, and offer solutions. Certainly there is no need whatever for an introduction along the lines of Snoad's abstract, especially since Genetic Resources Centres is now likely to be the first item on the agenda. I took it for granted that his contribution would be on a specific topic, such as the documentation of genetic information, something along the lines of his Izmir paper.

... I enclose two (2) copies of a circular about publication, one for Hersh whose address I have not got. I am sending them to Seidewitz and Snoad.

Best regards.

Yours sincerely,

OHF

(O.H. Frankel)

P.S. I have just received from Rome a copy of your letter to Jorge of Dec. 5. I would understand the situation much better if I had an abstract of your own paper which, I take it, will be the most crucial one of the session. I do not think Snoad could give an adequate historical picture of gene bank documentation - has he ever had much to do with it until Izmir? Is there really a need for history - this would heavily involve Cal, and all the muddles of the last 6-8 years? I should be happier if one were to grapple with the problem as it now exists, and you are surely the man to deal with this. I agree with you - never mind the abstracts at this stage; but I am much concerned with the papers themselves and the contribution they make to clarification and to action in the next few years. I am sure you view the situation in the same way, but let us be clear what everyone is to contribute. Stop press: your abstract just received from Rome - very appropriate. My comments about "history" still apply! Avoid it like the plague.

FAO Technical Conference on Crop Genetic Resources (in co-operation with IBP), March 1973.

P.O. Box [illegible],
CANBERRA CITY, A.C.T., 2601,
AUSTRALIA.

January 15, 1973.

You may have been informed by the convener of the section in which you have kindly agreed to speak that many of the contributions to the conference are to be included in a book which is to be one of the "synthesis volumes" to be published for the International Biological Programme (IBP) by the Cambridge University Press.

In the context of this series the publication of this volume is to be the concluding effort in a series of activities throughout the 10 years of the IBP. In the area of plant gene pools, the role of IBP has been to collaborate with FAO in the clarification of scientific and methodological issues, the definition of goals and strategies, the preparation of guidelines for national and international participation, the planning and initiation of action programmes, and the dissemination of information at scientific, national and U.N. levels. Participation in the organization of the Technical Conferences in 1967 and 1972, in the Survey of Genetic Resources in the Field (1971/72), in the U.N. Conference on the Human Environment, and the publication of IBP Handbook No. 11 (Genetic Resources in Plants - their Exploration and Conservation) were some of these activities.

Most of the papers to be presented at the conference fall into one or another of the areas of IBP participation. They will indicate the progress which has been made in these 10 years, hence their inclusion in a synthesis volume will be appropriate. Others will be factual reports some of which may lend themselves to presentation as a group, or in the form of extended summaries. As editors we shall be responsible not only for the suitability of contributions in the context of the series, but for the overall length which is restricted to 300 pages by agreement between IBP and the publishers. It may be necessary to modify, reduce or reject some contributions, while giving extended space to scientific fields which had received insufficient attention in Handbook No. 11, and to issues of special practical significance. Population problems, conservation methods, and documentation clearly qualify on both these scores. In some instances we may have to look for additional material if this seems to be necessary in the interests of providing a full coverage of the subject.

Section conveners have no doubt mentioned to you that a full text of your paper is needed by mid-January. Should you find that, in the light of what has taken place at the conference, you need to modify the text of your contribution, we shall be pleased to receive an amended version subsequently. However, I am sure you will understand that for reasons of speed of publication we must impose a 'deadline'. Therefore, we shall not be able to include for publication any material received later than May 1st, 1973.

Authors will, of course, be consulted should any major changes be proposed by the editors, and they will receive the first set of proofs for corrections of errors by the printers. One copy of the book and 50 reprints will be issued free to authors.

We should like to take this opportunity of thanking you for your very kind collaboration in what we hope will be a publication of considerable interest and importance in the field of genetic resources.

Yours sincerely,

O.H. Frankel J.G. Hawkes

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99163

DEPARTMENT OF AGRONOMY AND SOILS

January 22, 1973

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Thank you for your letter. However, I did not receive any negative or other response relative to IASA support to the Rome meetings nor do I know who you contacted. The information I had was from Sir Otto. You did not inform me of their reply to you so that I could follow up on it. Further, I still do not know who IAEA is funding from the U.S. or on what basis he was selected.

I had no way of establishing when you had called since you wrote no confirming letter. Regrettably there was no way in which I could even help in the matter since I was not informed.

As I wrote you earlier, I did recently contact IAEA. They do have my sabbatical plan and information that I will join them. I have had no reply from them at this point and only have been told by Sir Otto and Jorge Leon that you have responsibility for the documentation program so the ball is yours.

Sincerely,

Cal

C. F. Konzak
Professor

CFK/am
CC: J. Leon
O. Frankel

Jan. 19, 1973

Dear Brian:

I'm sorry for the confusion in your mind, the result of inadequate communication from me. Somehow, I assumed that you would know the full scope of the meeting in Rome, though now I can't imagine how you would know, since Jorge sent me a copy of the proposed general agenda, which included the full 8 sessions, number 7 of which is documentation.

I had hoped that you would cover the historical aspects of the various groups to bring about good documentation, and such history would include the first efforts at data recording (a guide sheet for types of data, and the construction of the data), various types of general file systems employed (only in very broad outline), efforts in different laboratories with such primitive systems as edge-punched cards, (if you know any of those), first trials with card-punching and sorting devices, some of the various efforts at developing information retrieval systems (of which you can expand on your own development), and present status of such systems.

Throughout our session, we should all attempt to point to the fundamental importance of data associated with the collections of seeds and other propagules. The genetic material is essentially value-less unless the information is associated with the genetic material from first collection throughout its use. Furthermore, we want to point out that documentation provides the basic source of information for guidance in the genetic resource center management. Somehow, the idea that the function of the center is dependent on what is known about the data in the center, for determining what the present status of the genetic material is, the need to collect new material, and what policies the institution will have in the future, is all important for us to bring to the attention of the conferees. In the past, it seems that data-gathering and management was thought of as a very side issue, to be done only as a last resort, or by low-order personnel.

The scientific value of the data can also be stressed, in addition to the "management" aspects mentioned in the above paragraph. In order for the world-wide network of genetic resource centers to be certain of their coverage of genetic materials, they must be able to know what they already have described, in order to measure their success in meeting their objectives scientifically. Clearly, information will help guide our future tests of the genetic materials, and the merit of the information will then be of most critical importance.

I hope the above words give you a clearer picture of the content of your talk. Lothar's contribution should give a picture of present-day thinking on data. Hersh will speak of the management aspects and how to use the information, and Rogers will talk about the potential values of one computing system, as exemplified (in part) by the Pilot Project. Thus, we have a good review of where x we are today, and where we are going in the future (but all relevant to documentation first, and to the general functions of the genetic resource center second.

If still not clear, let me have your questions again.

Sincerely

Jan. 18, 1973

Sir Otto Frankel
CSIRO
Devision of Plant Industry
P.O. Box 1600
Canberra City, A.C.T. 2601
Australia

Dear Otto:

Enclosed are my letters to Cal Konzak. They are self-explanatory.

I had also received your letter to him, which helped in making the proper response to him.

I have sent corrected abstracts of Snoad's and Seidewitz's contribution to the session on documentation to Jorge. I at first thought the generality of the abstracts was all right, but agree that they were a bit too general for the purpose. They have been corrected.

Sincerely,

David J. Rogers

JOHN INNES INSTITUTE
COLNEY LANE, NORWICH, NOR 70F
Norwich 52571

BS/td

19th January, 1973.

Professor D. J. Rogers,
University of Colorado,
Boulder, Colorado,
80302, U.S.A.

Dear Dave,

Here is a copy of the text of the paper for the Rome meeting on Documentation. I hope that it meets with approval in Rome and Australia; it certainly follows the amended abstract.

I am sending a copy to Jorge Leon so no doubt I shall hear his comments in due course. I feel that the subject of documentation needs introducing in this way; history, discussions on standardisation, the introduction of TAXIR, how and what to record, the achievements and finally the aims and the benefits.

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

UNIVERSITY OF COLORADO
BOULDER, COLORADO 80302

Department of Environmental,
Population and Organismic Biology

January 18, 1973

Dr. C. F. Konsak
Department of Agronomy and Soils
Washington State University
Pullman, Washington 99163

Dear Cal:

I have just returned to office, and found your letter of Jan. 8. Your recollection of dates of my telephone call to you is a little off--it was in June that I called you about participation in the Rome meeting.

After talking to you, I proposed a schedule for the session on documentation to Drs. Frankel and Leon, including a contribution from you. This was done on June 7, 1972. In that letter, I suggested (as you had asked me) that funding might be forthcoming from IAEC. They told me in reply that there were no funds available for more than one contributor to this session from the United States. I then asked that they convey this message to you, which apparently they did some time this past fall. I assumed from this that you had not been able to make appropriate arrangements.

I then went ahead with the development of the program, getting speakers who could be fit into the budget available for us.

I am sorry that you were not included, but there apparently were no means by which it could be accomplished.

Sincerely,

Dave

David J. Rogers
Professor of Biology

cc.: Drs. Leon and Frankel

FAO Technical Conference on Crop Genetic Resources (in co-operation with IBP), March 1973.

P.O. Box [illegible],
CANBERRA CITY, A.C.T., 2601,
AUSTRALIA.

January 15, 1973.

You may have been informed by the convener of the section in which you have kindly agreed to speak that many of the contributions to the conference are to be included in a book which is to be one of the "synthesis volumes" to be published for the International Biological Programme (IBP) by the Cambridge University Press.

In the context of this series the publication of this volume is to be the concluding effort in a series of activities throughout the 10 years of the IBP. In the area of plant gene pools, the role of IBP has been to collaborate with FAO in the clarification of scientific and methodological issues, the definition of goals and strategies, the preparation of guidelines for national and international participation, the planning and initiation of action programmes, and the dissemination of information at scientific, national and U.N. levels. Participation in the organization of the Technical Conferences in 1967 and 1972, in the Survey of Genetic Resources in the Field (1971/72), in the U.N. Conference on the Human Environment, and the publication of IBP Handbook No. 11 (Genetic Resources in Plants - their Exploration and Conservation) were some of these activities.

Most of the papers to be presented at the conference fall into one or another of the areas of IBP participation. They will indicate the progress which has been made in these 10 years, hence their inclusion in a synthesis volume will be appropriate. Others will be factual reports some of which may lend themselves to presentation as a group, or in the form of extended summaries. As editors we shall be responsible not only for the suitability of contributions in the context of the series, but for the overall length which is restricted to 300 pages by agreement between IBP and the publishers. It may be necessary to modify, reduce or reject some contributions, while giving extended space to scientific fields which had received insufficient attention in Handbook No. 11, and to issues of special practical significance. Population problems, conservation methods, and documentation clearly qualify on both these scores. In some instances we may have to look for additional material if this seems to be necessary in the interests of providing a full coverage of the subject.

Section conveners have no doubt mentioned to you that a full text of your paper is needed by mid-January. Should you find that, in the light of what has taken place at the conference, you need to modify the text of your contribution, we shall be pleased to receive an amended version subsequently. However, I am sure you will understand that for reasons of speed of publication we must impose a 'deadline'. Therefore, we shall not be able to include for publication any material received later than May 1st, 1973.

Authors will, of course, be consulted should any major changes be proposed by the editors, and they will receive the first set of proofs for corrections of errors by the printers. One copy of the book and 50 reprints will be issued free to authors.

We should like to take this opportunity of thanking you for your very kind collaboration in what we hope will be a publication of considerable interest and importance in the field of genetic resources.

Yours sincerely,

O.H. Frankel J.G. Hawkes

AIRMAIL

OHF:JFW
Ref:

24th January, 1973.

Dr. B. Snoad,
Department of Applied Genetics,
John Innes Institute,
University of East Angloa,
NORWICH. UK.

Dear Brian,

Thank you for the copy of your letter to Dave of 15 January. I have written to him again making some suggestions about your paper, and must leave it to him to consult with you. But to save time, here is some information about the conference. "Genetic Resources Centres" will have been discussed from various angles under several headings: "Genetic Conservation Centres" (probably section 1) conservation (section 4), evaluation (section 5) - in fact all technical and organizational aspects except documentation. I have just discovered an early outline written by Dave, in which he specifies your contribution as follows: "The most critical gene bank data, their structure, organization and efficient means to collect them." This sounded, and sounds, fine to me. It even gives you a chance to cut through the knot of semantics which has tied up this whole area for years. Please remember the matter of publication - either in individual, related, contributions, or in a joint chapter; I have written to Dave about this. I enclose a circular on this matter, but the form of publication must be settled between Dave and the other contributors. You will have to remember that this will be a book, not "proceedings".

Best regards.

Yours sincerely,

(O.H. Frankel)

Dr. Rogers,

Copy referred for your information.

(O.H. Frankel)

CSIRO

AIRMAIL

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600, CANBERRA CITY, A.C.T. 2601 TELEPHONE 48 7722 TELEGRAMS PLANTINDUSTRY CANBERRA TELEX 62351

OHF:PT
Ref:

15th December, 1972

Professor D.J. Rogers,
Project Coordinator,
Gulf Universities Research Consortium,
GURC Field Office,
NASA/Mississippi Test Facility,
Bay St. Louis, Mississippi 39520, U.S.A.

Dear Dave,

I hear from FAO that Jorge has written to you critically about the abstracts by Snoad and Seidewitz; I have not seen the copies. I am concerned about them since these papers are to be the basis of chapters in the book - unless it is decided to combine some or all contributions in your section into one chapter. This Jack Hawkes and I will be discussing with you in Rome.

In the meantime a few comments on these two.

1. Snoad. First, we cannot start every paper with a restatement of the well known position of gene pools. Hence most of paragraph 1 is unnecessary. Second, I do not know what the statements made in the second paragraph contribute to knowledge. At the top of page 2 he promises "defining a gene bank and some of its functions". That certainly is not his function; if you find it necessary to clarify any doubtful issues, you should do so in your own introduction, although I feel this might not be profitable. The overall "definition" arises from the purposes, and these will amply emerge from the operational considerations. My feeling is that Snoad should confine himself to documentation issues. The interrelations of gene banks in general, are the subject of the 7th section. But their relations with regard to documentation are very much the subject of your section. Indeed, this was deliberately placed ahead of the next one, since documentation could constitute a very important link between gene banks. It was logical to discuss this aspect ahead of the general (and partly political) aspects. I think this abstract is wrong almost from start to finish.

I do not think there is much wrong with Seidewitz's abstract, apart from its length, and of course its title. We cannot have a report on the activities of individual centres. If you want him to deal with his "descriptors" and "thesaurus" - well and good. Thenthe paper should be called appropriately, and start somewhere on the lower half of p.1, and briefly set out the aims and objectives, with the minimum of detail.

With best wishes for Xmas and the New Year.

Yours,
Dictated by Dr. Frankel
and signed in his absence

(O.H. Frankel)
per Joan Doyle

December 5, 1972

Dr. Lothar Seidewitz
Institut Pflanzenbau FAL
33 Braunschweig
Bendesallee 50
West Germany

Dear Lothar:

Thank you for the copy of your abstract of your contribution to the Rome meeting. I will remind you also that Dr. Leon wants the full text of your presentation by February 1.

We will have only four papers to be presented at our section on Documentation. I had originally hoped to have Dr. Mario Gutierrez from the Rockefeller Maize and Wheat Center in Mexico City to present a paper, but he has declined. That leaves you, Brian Snoad, Gil Hersh and me to make presentations. I think we will cover all the necessary points in our combined efforts.

Will you please ask Brian Snoad for a copy of his Abstract? I am not sure that I asked him to send you one, but his paper should be useful to you as you prepare the final text for presentation. I am enclosing mine and Hersh's Abstract so that they will complement your own. Also, if you have not sent Snoad a copy to Snoad, please do so.

Looking forward to our next meeting, in Rome with anticipation,

Sincerely,

David J. Rogers

Encl.: 2 Abstracts.

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. AGPE - PL 7/40

Dear Dave,

Enclosed are two abstracts, one by Snoad and the other by Seidewitz. Before sending them to be printed, I am forwarding them to you for editing.

Snoad's seems to cover the whole spectrum of genetic resources. Let us hope that he does not take the short time he has to discuss all the obvious matters he mentions in the abstract. Seidewitz's is, in my opinion, good in the essentials, but you may like to put it into better English. Sorry to disturb you on these matters, but they are under your section.

With best regards,

Yours sincerely,

Dr. Jorge León
Chief
Crop Ecology and Genetic Resources Unit

Prof. D.J. Rogers
Department of Biology
University of Colorado
Boulder
Colorado 80302
U.S.A.

TELEPHONE: NORWICH 52571.

JOHN INNES INSTITUTE,
COLNEY LANE,
NORWICH,
NORFOLK, NOR 70F,
ENGLAND.

BS/PP

11th December, 1972.

Professor David J Rogers,
Professor of Biology,
Department of Environmental,
Population & Organismic Biology,
University of Colorado,
Boulder,
Colorado 80302.
U.S.A.

Dear Dave,

Many thanks for your letter of 30th November and for the abstracts of the papers which you and Gil Hersh will be giving in Rome.

I have sent a copy of my abstract to Lothar and he has in turn sent me a copy of his own presentation so I assume that by now you will have had a copy too.

Kind regards,

Yours sincerely,

Brian Snoad,
Department of Applied Genetics.

December 5, 1972

Dr. Lothar Seidewitz
Institut Pflanzenbau FAL
33 Braunschweig
Bendesallee 50
West Germany

Dear Lothar:

Thank you for the copy of your abstract of your contribution to the Rome meeting. I will remind you also that Dr. Leon wants the full text of your presentation by February 1.

We will have only four papers to be presented at our section on Documentation. I had originally hoped to have Dr. Mario Gutierrez from the Rockefeller Maize and Wheat Center in Mexico City to present a paper, but he has declined. That leaves you, Brian Snoad, Gil Hersh and me to make presentations. I think we will cover all the necessary points in our combined efforts.

Will you please ask Brian Snoad for a copy of his Abstract? I am not sure that I asked him to send you one, but his paper should be useful to you as you prepare the final text for presentation. I am enclosing mine and Hersh's Abstract so that they will complement your own. Also, if you have not sent Snoad a copy to Snoad, please do so.

Looking forward to our next meeting, in Rome with anticipation,

Sincerely,

David J. Rogers

Encl.: 2 Abstracts.

December 29, 1972

Ref.: AGPE - PL 7/40
Dec. 5, 1972

Dr. Jorge Leon:
FAO
Rome, Italy

Dear Jorge:

Sorry not to respond to your letter of Dec. 5, enclosing Snoad's and Seidewitz's abstracts. Sickness and semester ending activities prevented an earlier response.

Snoad's abstract is indeed broad, and would seem not to speak to the problems of documentation, but in my instructions to him, I asked him to give an historical picture of gene bank documentation systems, as well as current problems therewith. That explains why the abstract seems too general. In his full text, however, I think you will see the need for such an approach, to lay the groundwork for the more detailed discussions such as those by Seidewitz and Hersh. If you do not object too strenuously, I should like to leave Snoad's abstract alone.

As far as the English in Seidewitz's, again, I think he communicates, even though his English lacks a little. His concepts are correct, and that is really what we wanted. I reread his abstract (since he had already sent me a copy earlier) and find that unless I rewrote the whole think, I would not really serve any usefull purpose. This sounds somewhat as though I am not acting responsibly, but again, hope that when the full text of his presentation are at hand, they will be much more meaningful.

I do believe that we will have a meaningful presentation overall, and put into place what is desired for documentation in genetic resource centers. Please bear with us on this matter.

We now have data for the pilot project from (1) Ft. Collins, (2) USDA Potato Center at Sturgeon Bay, and (3) from the IPC, Lima. We did not get the data from Scotland, as we had hoped, but do have a fair representation of the types of data from the first three above. The data are now nearing completion in the computer, and results should be forthcoming within a week. I hope you will act as one of the "examiners" of the results, and instructions on this activity will be forthcoming.

With best wishes for a Happy New Year to you and the staff, and to your family.

Sincerely,

Nov. 30 1972

Dr. Brian Snoad
John Innes Institute
Colney Lane
Norwich, NOR 70F

Dear Brian:

Enclosed are copies of abstracts of my paper, and that of Gil Hersh. I have not received Lothar's abstract yet.

Your abstract came in good time, and is, to my mind, perfectly satisfactory. You might send a copy to Lothar, so that he can fit his work into the pattern.

Thanks for your prompt submission.

Sincerely,

David J. Rogers
Professor of Biology

Encl: 2 Abstracts.

Dr. Richard L. Sawyer
General Director
Centro Internacional de la Papa
Lima, Peru

Dear Dr. Sawyer:

We have today received the 200 accession records of your data and are pleased to have them.

We are also pleased to know you will be willing to act as an examiner of the results of the pilot study. You will soon receive some information on the role of the examiners.

Sincerely,

David J. Rogers
Professor of Biology

DJR/cr

INSTITUT FÜR PFLANZENBAU UND SAATGUTFORSCHUNG
FORSCHUNGSANSTALT FÜR LANDWIRTSCHAFT BRAUNSCHWEIG-VÖLKENRODE

Direktor: Prof. Dr. D. Bommer

Genebank
Institut Pflanzenbau FAL 33 Braunschweig Bundesallee 50

Professor Dr. David J. Rogers

University of Colorado
Department of Biology

B o u l d e r , Colo. 80302

U. S. A.

Ihre Zeichen	Ihre Nachricht vom	Unsere Zeichen	Telefon 05 31 / 59 61 Durchwahl 596	Datum
	Nov.16,1972	Sei/Sp 12-5	375	Nov. 29th, 1972

Dear Dave,

The day before yesterday I received your memo of November 16th just after having returned from a duty trip to Versailles and Wageningen The preparation of the trip took quite a while so that the compilation of the summary unfortunately was delayed. A copy of the abstract was airmailed to you and expressmailed to Jorge León on Monday, November 27th, hoping that they will arrive in time.

You are kindly asked to make changes of the essay if you want to correct anything. In that case please let me know.

With best regards,
sincerely yours,

Lothar

(L. Seidewitz)

Drahtwort: Landforschung Braunschweig Station für Fracht- und Expreßgut: Bhf. Braunschweig-Lehndorf

CENTRO INTERNACIONAL DE MEJORAMIENTO DE MAIZ Y TRIGO

INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER

CIMMYT

Londres 40, México 6, D. F.
Apdo. Postal 6-641
Cable: CENCIMMYT

November 27, 1972

Dr. David J. Rogers, Professor
Department of Environmental,
Populations and Organismic Biology
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

I have just received your memorandum of November 16th. reminding the participants in the FAO/IBP Technical Conference on Crop Genetic Resources that the deadline for the submission of abstracts is November 30th. I believe it was sent to me by mistake since on November 10th. I notified you that I would not be able to participate in the Conference. I hope you received my letter but in case it did not arrive, I am sending the enclosed copy.

Sincerely,

Mario Gutiérrez G.

enc.
c.c. Dr. Jorge León A.
MGG/iv

The University of Birmingham

The University of Birmingham, P.O. Box 363, Birmingham B15 2TT
Telephone 021-472 1301

From: Professor J. G. Hawkes,
Department of Botany.

Prof. D. J. Rogers,
Taximetrics Laboratory,
Department of Biology,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

JGH/DMW

22nd November 1972

Dear Dave,

Thanks for your letter of 14th November. I am glad to know that the additional assistance for your trip last July has been received. I am also glad to know that things are progressing well for the pilot project and that you have had letters from Rowe, Sawyer and Simmonds. Recently Sawyer sent me a batch of information which may be intended for sending on to you or may be a duplicate for my own files. This concerns the actual records for Nos. 2,001 to 2,200 . If you have not had them by the time you receive this letter please tell me immediately and I will forward them to you since Sawyer may have understood that he had to send them to me rather than to you direct.

I have shown your letter to Brian Kershaw but I have not had a reply from him because he has only just seen it and will need to think about it for a little while.

We are all very grateful to you and your group for doing this pilot project and for carrying it out at no expense to FAO or other bodies. I do hope, however, that you will manage to obtain funds from National Science Foundation or any other convenient sources.

I think that is all the news for the moment and I shall be writing again later when I hear from you about the data from Sawyer.

Best wishes,

Yours ever,

Jack

J. G. Hawkes

The University of Birmingham

The University of Birmingham, P.O. Box 363, Birmingham B15 2TT
Telephone 021-472 1301

From: Professor J. G. Hawkes,
Department of Botany.

Prof. D. J. Rogers,
Taximetrics Laboratory,
Department of Biology,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

JGH/DMW

22nd November 1972

Dear Dave,

Thanks for your letter of 14th November. I am glad to know that the additional assistance for your trip last July has been received. I am also glad to know that things are progressing well for the pilot project and that you have had letters from Rowe, Sawyer and Simmonds. Recently Sawyer sent me a batch of information which may be intended for sending on to you or may be a duplicate for my own files. This concerns the actual records for Nos. 2,001 to 2,200 . If you have not had them by the time you receive this letter please tell me immediately and I will forward them to you since Sawyer may have understood that he had to send them to me rather than to you direct.

I have shown your letter to Brian Kershaw but I have not had a reply from him because he has only just seen it and will need to think about it for a little while.

We are all very grateful to you and your group for doing this pilot project and for carrying it out at no expense to FAO or other bodies. I do hope, however, that you will manage to obtain funds from National Science Foundation or any other convenient sources.

I think that is all the news for the moment and I shall be writing again later when I hear from you about the data from Sawyer.

Best wishes,

Yours ever,

Jack

J. G. Hawkes

To:

Dr. Brian Snoad
Dr. Lothar Seidewitz
Dr. Mario Gutierrez C.
Mr. Gilbert Hersh

November 16, 1972

From: David J. Rogers

Subject: Submission of abstracts for Technical Conference in Rome

Let me remind you of the absolute deadline of November 30 for submission of 500 word abstracts.

Please send one copy of your abstract to Dr. Jorge Leon, Chief,
Crop Ecology and Genetic Resources Unit
FAO
Via delle Terme de Caracalla
00100-Rome
Italy

Please send copy to me for editing and information.

Thank you,

David J. Rogers
Professor of Biology

November 15, 1972

Dr. P. R. Rowe
Department of Horticulture
University of Wisconsin
Madison, Wisconsin 53706

Dear Dr. Rowe,

Thank you for your very prompt delivery of the cards, the listing and the descriptions in your letter. We should be processing these data shortly.

I will give you (and others involved) instructions on your role as examiners at the appropriate time.

You will be hearing from us fairly shortly.

Sincerely,

David J. Rogers,
Professor of Biology

DJR/jir

Nov. 14, 1972

Dear Jack: Hawkes

Yours of 1st November, and 24 October have arrived. Also, the additional assistance with my trip last July has been received. Thanks for your continuing effort to help my expenses, but I hope you will feel no further obligation in this regard.

Things progress well for the Pilot Project. Roger Rowe has sent a listing of the data he will provide, and we have had letters from both Sawyer and Simmonds with their cordial responses to your invitation. In addition to the good news on the substantive problems of data for the project, I have also been encouraged to find that I can probably get interim financing in small amounts to help with the work. One group in the NSF (National Science Foundation) seems sufficiently interested to encourage this type work.

Brian Kershaw's comments are very good, and I appreciate receiving a copy. He certainly brings up several problems of critical importance, and we will take cognizance of them, as we can. You may wish to tell him that I have largely agreed to most of his points, and have had some of the same points made in other settings. I would particularly like to see comparisons made of several information storage and retrieval systems before final adoption of any one. But I suspect that what will happen is that we will merge the best from several systems, rather than have a single system to the exclusion of any other. He asks whether TAXIR has any "hidden" snags. He refers to a type of arithmetic procedure in the querying system, and the answer, in a nutshell, is that TAXIR can handle that particular type of arithmetic manipulation in its querying system. But that still might leave "hidden" snags of other sorts, and all I can say is that <u>any</u> system will have these. I don't think they are really "hidden", and if they are, they might come out in the demonstration.

We approach the development of the necessary systems in the same way that Henry Ford approached the production of his famous "Model T" Ford--at first that car was a far cry from the complete automobile, but at least, it got people from one place to another. Ford said that it wasn't perfect, but if you wait for perfection, you never will get anywhere. So also with TAXIR. The programs are under constant development, and each new application will teach you something you need to add.

We will carry out the work in the States simply because nobody in the the genetic resource centers has any money to do it anywhere else, and we will do it at no cost to genetic resource organizations. In this connection, you might show Brian our earlier statement to you on the availability of TAXIR, and how we would like to share it with others.

I certainly have not answered all his criticisms--I haven't time. However, I hope he can get our concepts from the above. Incidentally, I am making TAXIR available to Frank Bisby at Southampton, because he has the necessary computer facilities to make an easy transfer.

S.J.R.

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F

Norwich 52571

BS/td

21st November, 1972.

Professor D. Rogers,
Taximetrics Laboratory,
Dept. of Biology,
University of Colorado,
Boulder, Colorado,
80302, U.S.A.

Dear Dave,

Thanks for your note regarding the address to which the abstract for the Rome Conference should be sent.

I have prepared an abstract and am sending a copy to Dr. Leon. As requested, one is enclosed for your information too: I hope the theme is satisfactory.

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

CENTRO INTERNACIONAL DE MEJORAMIENTO DE MAIZ Y TRIGO

INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER

CIMMYT

Londres 40, México 6, D. F.
Apdo. Postal 6-641
Cable: CENCIMMYT

November 10, 1972

Dr. David J. Rogers
Department of Environmental,
Populations and Organismic Biology
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

Thank you very much for your letter of October 17th and the information regarding the FAO/IBP Technical Conference on Crop Genetic Resources and the list of topics and participants on the section dealing with documentation.

I regret not to be able to accept your kind invitation but will be very interested in learning of the discussions and recommendations and will try to implement them to the greatest extent in the operation of CIMMYT's maize germplasm bank.

Should you need an alternate speaker, I would like to suggest Dr. Joe C. Craddock who is in charge of the small grain collection of the U.S.D.A. and has far more experience on documentation than I do. His address is U.S.D.A., Agricultural Research Service, Plant Genetics and Germplasm Institute, Grain Collection Building 046, Beltsville, Maryland 20705.

Sincerely,

Mario Gutiérrez G.

MGG/iv

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME | Cables: FOODAGRI ROME | Telex: 61181 FOODAGRI | Telephone: 5797

Ref. AGPE - PL 7/40

Dear Dave,

FAO Technical Conference on Crop Genetic Resources

As time is pressing on, I feel I should remind you that we need to receive copies of the abstracts of papers before 30 November in order to have them in time for translation and printing.

I suggest that you ask the contributors in your section to send you a duplicate of their abstracts as soon as possible, and please be good enough to edit these and make sure they conform to the maximum length of 500 words. We shall not go ahead with the preparation of any abstracts received here, without approval from the appropriate section organizer.

With best regards,

Yours sincerely,

Dr. Jorge León
Chief
Crop Ecology and Genetic Resources Unit

Prof. D.J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80302
U.S.A.

P.D. Many thanks for your excellent paper on yeas.

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F

Norwich 52571

BS/td 9th November, 1972.

Professor D. J. Rogers,
Taximetrics Laboratory,
Dept. of Biology,
University of Colorado,
Boulder, Colorado 80302
U.S.A.

Dear Dave,

Many thanks for your letter of 31st October. I am quite relieved to know that I shall only be required to talk for a maximum of 30 mins at theRome meeting. This seems far more realistic for an introductory paper.

I will do my best to prepare an abstract by the end of November and a full draft two months later. By the way, where shall I send all this in Rome - to Erna Bennett at FAO perhaps?

It would obviously help me to know something about the content of the subsequent papers and so I would appreciate being kept informed with copies of abstracts etc., if possible.

By the way, I heard this week from Lothar Seidewitz that they are having problems with running TAXIR on their Siemens computer. He has even asked for the Pisum program in order to try using it on their IBM 1100 which I think would be a very retrograde step. As you know, the Pisum scheme is fixed format and very crop-specific and would require a fantastic amount of work to accommodate the amount of information which I assume has been collected by now in Braunschweig. Presumably someone from Germany needs to spend some time in Colorado in order to understand the conversion.

I was pleased to hear that the hot potatoes have cooled down and that progress is being made with the pilot study. Also its good to know that data are forthcoming from Fort Collins.

Best wishes,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

INSTITUT FÜR PFLANZENBAU UND SAATGUTFORSCHUNG
FORSCHUNGSANSTALT FÜR LANDWIRTSCHAFT BRAUNSCHWEIG-VÖLKENRODE

Direktor: Prof. Dr. D. Bommer

Genebank
Institut Pflanzenbau FAL 33 Braunschweig Bundesallee 50

Professor of Biology
Dr. David J. Rogers

Taximetrics Laboratory
University of Colorado

Boulder, Colorado 80302

USA

Ihre Zeichen	Ihre Nachricht vom	Unsere Zeichen	Telefon 05 31 / 59 61 Durchwahl 596	Datum
	10-23-72	Sei/Sp 12-24/2	375	8. Nov. 1972

Dear Dave,

Thank you for your letter of October 23rd, 1972.

The suggested outline for my paper comprises following points:

1. Organization of genebank data at Braunschweig-Voelkenrode. Presentation of forms for data uptake referring to general (non-cropspecific) and crop-specific information.

2. Experience with computerized data storage and retrieval.

3. Presentation of a pilot model for a multilingual thesaurus with suggested rules for standardization of descriptor states.

The Izmir report was sent to Prof. J. Hawkes, Birmingham and Dr. Lamberts, Wageningen, from where I expected the report to be disseminated. Calvin Konzak has had a look on the report together with Prof. Porceddu before it was sent off.

Looking forward to seeing you soon I remain,

with best regards,
sincerely yours,

Lothar

(Lothar Seidewitz)

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. PL 2/8

NOV. - 8-1972

From: Sir Otto Frankel, c/o Dr. J. León, AGPE

Permanent address:

CSIRO Division of Plant Industry, P.O. Box 1600, Canberra, A.C.T. 2601 Australia

AGP REGISTRY

In reply please mention our reference and date of this letter

Dear Professor Rogers,

Thank you for sending me a copy of your proposal for a pilot project on documentation of information of genetic resources centres. Such a study is needed to demonstrate the operational procedures which will be important as the movement toward a global network of genetic resources centres gets into the planning stages. From the statement of the proposed pilot project, which was recommended by the Birmingham Workshop on information systems for World Genetic Resources, I think you have covered most of the salient points which should be included in such a pilot study.

Since you will be explaining the pilot study at the forthcoming Technical Conference on Crop Genetic Resources in Rome in March 1973, we will have an opportunity to assess the benefits from such a system. I understand that you have volunteered your services, and those of your laboratory, to accomplish the work of the pilot project. I trust that you will be able to find sufficient funds to cover your expenses, but I must say that this letter does not constitute any agreement on my part as to official IBP sanction and/or financial obligation.

Yours sincerely,

O.H. Frankel

O.H. Frankel
Convener, Committee on Plant Gene Pools
International Biological Programme

Professor D.J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80302
U.S.A.

FAO/IBP Tech. Conf. - Rome

Oct. 31, 1972

Dr. Brian Snoad
Dept. of Applied Genetics
John Innes Institute
Colney Lane
Norwich, NOR7OF
England

Dear Brian:

I finally respond to your letter of the 3rd. The news in a nutshell is:

1. Lothar Seidewitz has written, and accepted.
2. The Mexican, Mario Guttierez, of CIMMYT, has not yet accepted, but sounds interested.

These indications tell me that you can stick to your time schedule for presentation at the meeting in Rome, and we will have a sufficiently full programme for documentation. Also, your outline, presented earlier, is fine. All you have to do now is send in an abstract before the end of November, and a full text two months later. Let me have a copy of the abstract, if you please--it will help.

The pilot study seems to have cleared all its hurdles, politically, and we are now in the process of going after data from a number of potato centers. Hopefully, we will get them here in time to do something with them, but somehow, I am pessimistic about prompt reply to my requests on these matters. It may be that Jack Hawkes is sufficient diplomat to get compliance better than I can.

I also have agreement from the National Seed Storage Lab., US Dept. of Agriculture, in Ft. Collins, for a suite of their general data, to represent a multiple-crop genetic resource center. I suspect that someone will say that these two types of data sources are not sufficient to cover all the problems the pilot study should examine, but then when you consider that I am doing this without any visible financial support, it is going to have to serve, unless someone comes across with sufficient funding to expand.

See you later.

Sincerely,

David J. Rogers
Professor of Biology

Oct. 31, 1972

Dr. J. G. Hawkes, Professor
Department of Botany
University of Birmingham
Birmingham B15 2TT
England

Dear Jack:

Your letters of 19th and 24th October, and letters from Jorge and Otto now have placed all things in place for the pilot project. A reworked copy of the proposal is included herewith. This second one is just for the records, and I hope that you will help me out by having copies made and sent to Jorge and to Otto.

I am glad to have your copies of letters to Simmonds and Sawyer. Their data will be most welcome, and since you have already contacted them, I will not write until they have made their decisions. Hopefully, that will be soon. Roger Rowe has already agreed, and I have a letter back to him on our needs. Dr. Louis Bass, Director of the National Seed Storage Laboratory has also agreed to cooperate, and we will be receiving data from him shortly.

Your point about all the examiners frightens me a little. The thought of including all the members of the workshop is just more correspondence than I can handle. An alternative might be to ask some of the members you can contact easily to share with you whatever materials I send to you for your consideration. However, time is an element which may prevent this. Certainly Otto, Jorge and Tommaso should/included as examiners. I had thought that the examiners should be: you, Otto, Jorge, Rowe, Sawyer, Simmonds, and Bass. Your friends from Holland should be added, clearly. But this should constitute a sufficiently broad and acknowledged good group to have standing with the international community.

be/

Your responses to Tommaso's critisims were excellent. Perhpas you should point out to him that Harriet Meadow does not have a system of her own, but she champions the system owned by IBM, which is a massive system which costs about $1200.00 per month to rent, and you are not its owner.

Incidentally, I never received a final copy of the Brimingham Workshop, nor of the final form of the resolutions. Could you send these to me at your convenience? Thanks.

Sincerely,

David J. Rogers
Professor of Biology

Encl.

IC 31/72

Dr. Otto Frankel
c/o Dr. Jorge Leon
Crop Ecology and Genetic Resources Unit
FAO
Rome

Dear Otto:

Thanks for yours of the 19th., indicating your willingness to put on your IBP Chairman's hat for our proposal on a pilot project.

May I suggest the following words for a letter to me, as follows:

Thank you for sending me a copy of your proposal for a pilot project on documentation of information of genetic resource centers. Such a study is needed to demonstrate the operational procedures which will be important as the movement toward a global network of genetic resource centers gets into the planning stages. From the statement of the proposed pilot project, which was recommended by the Birmingham Workshop on information systems for World Genetic Resources, I think you have covered most of the salient points which should be included in such a pilot study. However, (here you should put in some words which say what I did not include, if you feel the need to). Since you will be explaining the pilot study at the forthcoming Technical Conference on Genetic Resources, In Rome in March, 1973, we will have an opportunity to assess the benefits from such a system. I understand that you have volunteered your services, and those of your laboratory, to accomplish the work of the pilot project. I trust that you will be able to find sufficient funds to cover your expenses, but I must say that this letter does not constitute any agreement on my part as to official IBP sanction and/or financial obligation.

End of suggestions.

Your participation in the examination of the pilot project results will be much appreciated. When we have made sufficient progress, we will contact you (if you tell me where). You will be, then, an "examiner."

Seidewitz finally wrote accepting the invitation to join our discussions in Rome. Still no word of acceptance from Mario Gutierrez.

A reworked proposal for the pilot project, with much less organizational planning, and less detail on the procedures, has just been forwarded to Jack. To save some of my scarce dollars, I am asking him to copy it and send copies to you and Jorge. We are actually in the process of writing to various sources for aid in preparation of data--letters to Sawyer, Simmonds, Rowe, and the director of the National Seed Storage Lab, Ft. Collins are on their way. Positive responses for cooperation have come in from Ft. Collins and Rowe, in Madison. We'll start work very shortly.

Hopefully, Jorge has received my suggestions for collection of propagation of *Manihot esculenta* materials. If he has not, please ask him to tell me.

Sincerely,

David J. Rogers

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. AGPE - PL 7/40
PL 9/41

Dear Dave,

Many thanks for your letter of 18 October and your excellent paper on cassava. As you rightly point out, the quarantine problem, especially in virus, is of foremost importance.

I believe Mario Gutièrrez may contribute with a very good discussion to your section on documentation, since he has wide experience, particularly in corn. Let us hope that he is included in the CIMMYT delegation.

With best regards,

Yours sincerely,

Dr. Jorge León
Chief
Crop Ecology and Genetic Resources Unit

Prof. D.J. Rogers
Department of Environmental,
Population and Organismic Biology
University of Colorado
Boulder
Colorado 80302
U.S.A.

October 23, 1972

Dr. Lothar Seidewitz
Institut Pflanzenbau FAL
33 Braunschweig
Bundesallee 50
West Germany

Dear Lothar:

I received your letter of 5 October with a great sense of pleasure (and relief)! I feared that something had happened to you, and if that had been true, it would have been very difficult to have a good program on documentation at the forthcoming Technical Conference.

The original group of speakers for Documentation had to be changed. Dr. House decided that he could not contribut to this particular session, and I have attempted to get a replacement for him by asking Dr. Mario Gutierrez of the International Wheat and Maize Center, (Rockefeller) in Mexico if he would present a paper on the experiences with documentation at his organization. He has not yet agreed to participate, but I hope to hear from him soon.

Brian Snoad, of John Innes Institute, has agreed, and his proposed outline is as follows:

Title: The structure, organisation and collection of gene bank data.

1. Introduction based upon Izmir and Birmingham conclusions.
2. Definition of a gene bank.
3. The functions of a gene bank
4. The types of data to be collected; based upon experience with Pisum where the records are far more detailed than would be necessary in a gene bank. Move on to other genera with details of other IR systems and data.
5. Recording methods for field and laboratory which incorporate some degree of standardisation.
6. Computer systems which by their very nature would give some degree of flexibility in order to overcome rigid standardization.
7. Conclusions and predictions regarding an international network of gene banks.

From this, which will be the introductory paper, I hope you can move on to cover the real experiences you have had there in Völkenrude, both in terms of structuring of data (which you have already done very well) and how it works in your own center. This will be followed by Mario Gutierrez (hopefully) and then Hersh will give a picture of organizational needs for gene bank work to include the documentation, and I will finish by giving an example of the pilot study, which was recommended at the Birmingham meeting.

Please send me an outline of your intended presentation, so that I may have more specific knowledge of the way the symposium is to develop.

Sincerely,

The University of Birmingham

The University of Birmingham, P.O. Box 363, Birmingham B15 2TT
Telephone 021-472 1301

From: Professor J. G. Hawkes,
Department of Botany.

Dr. D. Rogers,
Dept. of Environmental Population and Organismic Biology,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

JGH/DMW

19th October 1972

Dear Dave,

You will see from the xeroxed copy of the letter received from Jorge León that he agrees with my comments and thinks that you should go ahead with the pilot project. Maybe you would like to wait a bit longer until you have had a reply from Otto Frankel but I thought you would like to know Jorge's reaction to my letter and to your report as soon as possible.

I am afraid that in spite of all my efforts on your behalf I have only managed to drum up the princely sum of £20 to help you with your travel expenses to Birmingham in July. You already got the $150 but of course these two amounts do not by any means cover your total expenses. The University is arranging for this money to be sent to you by air mail transfer. I hope you will receive this in due course, but if not please do not hesitate to let me know.

No more for the present except to ask you where you think I should contact the International Potato Centre at Lima and the Commonwealth Potato Collection in Edinburgh at this stage.

Best wishes,

Yours,

Jack

J. G. Hawkes

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. AGPE - PL 2/8
PL 7/40

From: Sir Otto Frankel, c/o Dr. J. León, AGPE

OCT 19 1972

Dear Dave,

I found your letter of 29 September on arrival in Rome a few days ago and discussed its contents with Jorge. His reaction is that since you do not require funds for the pilot project but only a magic word from someone with some degree of authority who asks you to undertake this task, the right person and in fact the only one in a position to say this word is Jack Hawkes. FAO could not do this for obvious reasons nor would it be possible for Jorge to do so in an unofficial capacity.

However, seeing that I have always done what was required at the moment when my IBP hat was convenient, I am quite willing to put it on and write to you as the Chairman of the IBP Committee on Plant Gene Pools, which may sound sufficiently impressive although the Committee really does not exist. Please let me know should you want this and in that case you might supply the few words which would be required by way of a draft.

As regards the section on documentation, I know Mario Gutierrez but have no idea whether he has much experience on documentation. Lothar Seidewitz on the other hand is "in the bag" and I am surprised that he has failed to answer your letter; he may have been on holiday. We have a letter from Bommer telling us that both his and Lothar's participation will be financed by their own institute so clearly their participation is assured and therefore Lothar's paper.

I shall be here until about 12 November so please write here in reply.

Best regards,

Yours sincerely,

OHF

O.H. Frankel

Prof. D.J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302
U.S.A.

Oct. 17, 1972

Dr. Mario Gutierrez G.
Centro Internacional de Mejoramient de Maiz y Trigo
Londres 40
Mexico 6, D.F.

Dear Dr. Gutierrez:

Thank you for your letter of October 5. In response to your request for further information on the Conference, I have the following comments.

I enclose a copy of the scientific topics to be covered at the Conference. This gives some idea of the scope and the types of individuals to be represented. Of course, each of the topics will have a number of speakers, whom I do not know as yet. For the section on Documentation, I have invited, and have acceptance from the following:

1. Dr. Brian Snoad, John Innes Institute
   Topic: The structure, organisation and collection of gene bank data.
2. Dr. Lothar Seidewitz, Institute Pflanzenbau FAL, West Germany
   Topic: EUCARPIA gene bank information systems organization.
3. Yourself, and I would like to suggest your topic to be: Experiences in connection with documentation of CIMMYT gene bank
4. Mr. Gil Hersh, from Univ. of Colorado.
   Topic: Operations research techniques as a guide to effective documentation systems for genetic resource information.
5. D.J. Rogers, address as above,
   Topic: Review of information management systems for genetic resource data.

From the above, you can see the structure which we hope to have for the symposium. It is intended to have a mix of papers on the systems used to handle documentation, as well as actual experiences in data centers. I hope that it will be possible to show the results of using a computerized system TAXIR, in actual use for gene bank type data. What I hope you can do in the program is to relate the way in which you have managed the data from one of the most important gene bank centers in the world.

The structure of the symposium is to present a 20 minute formal paper, with a short period of discussion following your presentation. According to Dr. Leon and Dr. Frankel, the organizers of the Conference, you will have to submit a 500 word summary of your presentation by November 30, 1972, and a full test of your presentation not later than two months before the Conference, (thus, in January). The idea is that the papers are to be published as an outcome of the conference.

I trust that this satisfies your need for information, and that I can have your early acceptance of this invitation to participate. Please let me hear from you as soon as possible.

Sincerely,

David J. Rogers.

Oct. 17, 1972

Dear Jack:

You and Roger Rowe are far ahead of me. I just wrote to Rowe (copy enclosed) on the 12th. It is very good news to hear that he already has punch card data. He should not work too hard to provide latitude-longitude data on thoseaccessions which do not already contain it. The point is that we should work with data as they already exist, and not demand that something not there will have to be provided before we accept them. I will tell Dr. Rowe this in my next communication to him.

With respect to data from Sawyer and Simmonds, again, let us not impose upon them any predetermined form which their data ~~must~~ (I'm doing my own typing, so forgive the strike-overs) must be presented in. We should ask these two gentlemen to let us use data appropriate to their own documentation, as they are presently gathering the data. No doubt they have designed some information system (although it may still be quite informal), even though the "system" they have is not a computer-oriented one. In the concept of the pilot study, we are not looking for large numbers of data, but variations in the types they gather, or intend to gather. I will ask Roger Rowe, for example, for no more than 200 accession records, and probably no more than that from the other two men.

The important thing to ask of Sawyer and Simmonds is the copies of the data they have, with a brief explanation of the form they are presently using. We need to know what each of their present formats means, and that is why I ask for an explanation to accompany their forms. I would emphasize in your letter to these genetlemen that they need not go to any extra effort to provide something they are not now doing. Our concept is that the information system which is to be finally adopted to global genetic resource centers be capable of using data as they are now, and that once the data system is established, it will then become apparent how they can do a better job in the future.

Your inclusion of both Sawyer and Simmonds is good news, because I was beginning to get some static from Rome to the effect that the work of the International Potato Center must be included, otherwise TAC would be unhappy. I learn a little more each time, and hopefully will someday be sufficiently knowledgeable to prevent being naive about the politics. Your guidance in this area is much appreciated.

It seems reasonable to ask both Sawyer and Simmonds to be "examiners" of pilot study and results. Will you ask them to join, along with whomever else you consider important?

Thanks for your help--we should get going before too much longer.

Sincerely,

David J. Rogers
Professor of Biology

Encl.

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME

Cables: FOODAGRI ROME

Telex: 61181 FOODAGRI

Telephone: 5797

AGP REGISTRY

In reply please mention reference and date of this letter

Ref. AGPE - PL 2/8

OCT. - 9 1972

Dear Jack,

With reference to your questions in your letter of 26 September on the possibility of using TAXIR, here are my comments:

Line 5(a) Yes.

Line 7(b) This we will have to see, and I agree with your suggestion of bringing it to the Conference in March.

Line 10 As far as Dave needs it, you could do the request as chairman of the BW. I believe this is enough for Rogers, as this may give him the opportunity to start the work. On this matter I will see what Otto says next week. Personally I am for it, but of course I could not commit FAO at this moment. If potatoes are chosen, the CIP should have an important role, as Sturgeon Bay and the others.

Line 22 Agree.

Policy Committee. Agree, particularly in having the representation of people and institutions that did not attend the BW.

Page 11 I have many doubts about an executive committee.

Page 12 Agree.

With best regards,

Yours sincerely,

Dr. Jorge León
Chief
Crop Ecology and Genetic Resources Unit

Prof. J.G. Hawkes
Department of Botany
The University of Birmingham
P.O. Box 363
Birmingham B15 2TT
England

Dictated by Dr. León but signed in his absence.

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F

Norwich 52571

BS/td

3rd October, 1972.

David J. Rogers,
Taximetrics Laboratory,
Dept. of Biology,
University of Colorado
Boulder, Colorado 80302
U.S.A.

Dear Dave,

Many thanks for your letter of 28th September.

I am sorry to hear that the responses to your requests for speakers at the Rome meeting have been somewhat slow. Nevertheless I feel that you should have no problems in filling the gaps and I imagine that Lothar Seidewitz will eventually indicate his willingness to attend.

Now to be more specific, I am not too keen on having to expand my own talk beyond the 20 to 30 minutes originally planned. I had hoped that it would serve as a general introduction and that the subsequent speakers would then be specific and fill in the details. You must remember that I am principally a geneticist and that my Pisum system. This has certainly given me experience in deciding what to record, how to record it and an insight into what sort of questions to anticipate. Beyond this, however, I think it would be up to the specialists such as gene bank directors, plant collectors and computer experts to outline in detail how these large, comprehensive systems will work.

Anyway I will have to leave the details to you because obviously what I have to say will have to be governed by the content of the subsequent presentations. Let me know how the symposium develops and I will do my best to fit in accordingly.

I am sorry to hear that you have run into "politically hot potatoes"! I had hoped that you would have been able to demonstrate how Taxir would cope with he potato collection by the time the Rome symposium took place. I am happy to report that I am quite ignorant of the reasons for the political factors which you report as being a stumbling block to implementing the recommendations of the Birmingham

cont/.....

JOHN INNES INSTITUTE
COLNEY LANE, NORWICH, NOR 70F
Norwich 52571

Workshop. At the same time, of course, this state of bliss prevents me from being able to provide you with an explanation. I sincerely hope that you will have demonstration material for the Rome meeting because this is the best and most convincing advertising material you could wish for.

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

CENTRO INTERNACIONAL DE MEJORAMIENTO DE MAIZ Y TRIGO

INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER

CIMMYT

Londres 40, México 6, D. F.
Apdo. Postal 6-641
Cable: CENCIMMYT

October 5, 1972

Dr. David J. Rogers
Professor of Biology
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

Thank you very much for your letter of September 13th. and your kind invitation to participate on the half-day Symposium on Documentation and Information which you are organizing to be held during the FAO - IBP Technical Conference on Genetic Resources.

Before accepting your invitation, I would like to have further information on the nature of the Symposium and the Conference. Any additional information on the nature and objectives of the Symposium and the tentative list of participants will be greatly appreciated.

Sincerely,

Mario Gutiérrez G.

MGG/iv

Sept. 28, 1972

Dear Lothar:

Since you have not responded to my letter of August 8, I wonder if you received my invitation to participate in the March, 1973 Technical Conference on Crop Genetic Resources.

Briefly, I asked if you would prepare a 20 minute paper on documentation as you are using the system in your own institute.

Since time is getting short, I must have a reply as to your willingness to participate. If I do not have a response to this letter, I will assume that you are not interested, and I will have to remove your name from the list of participants.

Sincerely yours,

David J. Rogers
Professor of Biology

FAO/IBP
Techn. Conf - Mar. 1973

Sept. 28, 1972

Dr. Brian Snoad
Department of Applied Genetics
John Innes Institute
Colney Lane
Norwich, NOR 70F

Dear Brian:

Thank you for your letter of the 13th. Your outline is excellent, and very comprehensive. The only comment that I have is that you need more than 20 minutes to present it, and, considering the developments, I believe you should have 30 to 40 minutes in which to present it. Even that length of time is very short to fully develop the concepts you have outlined, and I will later see if you may not have more time.

House, who I had on the original schedule, has decided not to participate, saying that he is "just a plant breeder" and not an expert in information retrieval. I have tried to find a suitable replacement for him, specifically a Dr. Mario Gutierez at the Rockfeller International Center for Maize and Wheat, in Mexico City. There has been no reply to my invitation to him.

Nor have I heard from Lothar Seidowitz of Germany. That doesn't sound very promising for the program. However, given your own input, and those that Hersh and I hope to present, I think we can more adequately cover the problems of documentation and information management than can a more diverse group of speakers.

Under these circumstances, I think you should plan to spend more time on your presentation than the orgiginal schedule. I will write to Leon and Frankel of the altered plans.

In August I sent a draft proposal of a pilot project for information management of genetic resources to Jack Hawkes. It followed the resolutions we established at Birmingham. I had hoped to have the project under way by now, but there are apparently some sort of delays caused by political factors of which I am not aware. This is disturbing, because I had hoped to steer clear of any embroilment with extraneous problems. If you have any insights into these problems, such as why are potatoes so hot politically? or, have we exceeded our powers by assuming that the resolutions from the Birmingham Workshop carried some weight? Any comments or information along these lines would be appreciated.

Looking forward to seeing you, and hearing your presentation in March.

Sincerely,

David J. Rogers
Professor of Biology

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. AGPE - PL 2/8

PERSONAL

SEP 14 1972

Dear Dave,

On my return today to the office, I found your letter of 17 August and the draft of the pilot project. As you want the comments by 15 September, I am sending you this personal letter, with no copies to other interested persons for reasons that you will find below.

First, as a whole your draft is very good in stating the objectives, structure and functions. However, you base it (in your Foreword) on resolutions taken by a small meeting, at which many of the interested parties were not represented. Also I don't think the appointment of certain people, no matter what their abilities and my personal sympathies for them, is something that should be stated in the preliminary phase of the project. Also the choice of potatoes is quite doubtful as good starting point. You may not know it, but there is an International Potato Centre, backed financially by TAC and supported by the Rockefeller Foundation and the governments of Holland, Germany, Peru, etc. It is to this Centre, and not to any other institution, that the proposed part of the project should be attached, if you want to obtain some funds for it.

I believe you should take the proposal to the March Conference, as your own personal contribution. Then let the meeting discuss it, and once approved, to incorporate in the group that is going to be established here with TAC support. This project was already approved by TAC, and includes as a very important component, the documentation section as outlined at the Izmir meeting. It is within this setup that you could make the best contribution.

Please let me know your reaction to this letter. It is written with the best of intentions, and please don't take

Dr. David J. Rogers
Professor of Biology
University of Colorado
Boulder
Colorado 80302
U.S.A.

it as a criticism of your plans, which again I think are excellent, but about which I have serious doubts as to their implementation.

With best regards to Connie and yourself,

Yours sincerely,

Jorge

Dr. Jorge León
Chief
Crop Ecology and Genetic Resources Unit

IBP/FAO Tech Conf. Rome

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F
Norwich 52571

BS/td

13th September, 1972.

Dr. D. J. Rogers,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

Dear Dave,

Here, as promised, are a few thoughts on the talk you have asked me to give in Rome. As I see it, being the first speaker, I would need to define the objectives and the agreements in quite general terms in order to let the more specific points be made by the other speakers.

I am enclosing for your comments an alternative title together with a few notes on the way I see this introductory talk being presented. Perhaps you would be good enough to look this over and let me know if you think it fits in with the framework you have in mind for this session.

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F
Norwich 52571

The structure, organisation and collection of gene bank data.

1. Introduction based upon Izmir and Birmingham conclusions.

2. Definition of a gene bank.

3. The functions of a gene bank.

4. The types of data to be collected; based upon experience with Pisum where the records are far more detailed than would be necessary in a gene bank. Move on to other genera with details of other IR systems and data.

5. Recording methods for field and laboratory which incorporate some degree of standardisation.

6. Computer systems which by their very nature would give some degree of flexibility in order to overcome rigid standardisation.

7. Conclusions and predictions regarding an international network of gene banks.

B.S.
13-9-72

The University of Birmingham

The University of Birmingham, P.O. Box 363, Birmingham B15 2TT
Telephone 021-472 1301

Dr. D.J.Rogers,
Biology Department,
University of Colorado,
Boulder,
Colorado, 80302.

OHF/SRD

11th September, 1972.

Dear Dave,

Thank you very much indeed for your most interesting letter of 5.9.72. I now really understand something of TAXIR which had puzzled me.

As you see I am with Jack just now, but having only just arrived have not discussed matters of mutual interest to the three of us. However, I am sure he will enlighten me further.

I am looking forward to hearing from you in Rome how you got on with the invitations to your Session of the Conference.

Best wishes.

Yours sincerely,

OHF

O.H. Frankel.

September 13, 1972

Dr. Mario Gutierrez
CIMMYT
Londres 40
Mexico 6, D.F., Mexico

Dear Dr. Gutierrez:

You may recall that we met in 1968 when we were attending an international conference on information retrieval held at Universidad Nacional. Since that time, I have continued my interest in the problems of information for biological problems, and have further developed the system, TAXIR.

As a result of my continued interest in these problems, I have been asked to organize a half-day symposium on documentation and information for the joint FAO-IBP Technical Conference on Genetic Resources to be held in Rome, in March, 1973. As organizer, it is my pleasure to invite you to participate by presenting a 20 minute formal paper on the activities in connection with documentation of the CIMMYT gene banks.

If you are interested in participating, please let me know at your earliest convenience, and I will provide details and background information for the technical conference.

I look forward to your acceptance of this invitation.

Sincerely yours,

David J. Rogers
Professor of Biology

Acknowledge by letter from Otto, from Birmingham, 11 Sept. 72
See In File

Biology Dept.
Univ. of Colo.
Boulder, Colo., 80302
Sept. 5, 1972

Dear Otto:

I have your letter of 22nd August, and appreciate the various suggestions and comments. I do hope you have a fine vacation in Greece. On the symposium, I do intend to introduce the session on information management, show the interrelations of the various topics, and probably, at the end, summarize the whole thing. Sorry I did not indicate my intentions earlier. So far, none of the invited speakers has responded, but I assume that they will at their convenience. I hope that the dust is settled as far as Cal Konsak is concerned, because I do not want him to feel that it was my personal decision on my part not to include him. Perhaps you and Jorge can decide the most appropriate means to keep him from feeling shut out.

I did indeed receive $150.00 from your limited IBP funds, and appreciate the contribution. I consider the remaining costs for my trip to Birmingham to be my personal contribution to this important endeavor. Don't worry--there are ways to recover!

Sorry to hear that I had given the wrong impressions on TAXIR training, etc., to Lothar Albrecht. The truth is that about two or three month's time, total, is needed, split between a computer programmer to learn the details of the program itself, and a "user" or the substantive scientist to learn the many facets of data structuring, handling, bank-building, and querying systems. I do not know where Albrecht's figure of one year for this training came from.

Also, somehow, Albrecht got the idea that the TAXIR system was so big that it could only be handled on the largest scale computers. There are complex responses to him on this subject, but the simplest reply I can think of is that TAXIR takes up much less space in the computer than any comparable system with which I am familiar (which includes those owned by the large computing machine manufacturers, such as IBM, CDC, UNIVAC, and several others developed at universities around the country). As a matter of fact, we are at present thinking of contracting with a small commercial organization to provide necessary configurations to use "mini" computers with TAXIR. The biggest requirement for TAXIR, or any other information retrieval system, is large memory capacity, attached to relatively unsophisticated central processors, and the minicomputers have such potentials. And they sell at much lower costs than do the computers sold by the big manufacturers. Our figure for storing TAXIR in the computer central memory is about 15,000 32 bit words of memory. Stopping to think of the many functions required of an information retrieval system, you will find that this figure is far lower than one would ordinarily think, and is, as a matter of fact, much smaller in memory requirements than many other computer programs. Furthermore, TAXIR employs a storing system for data that guarantees the most efficient use of storage available in the various types of computing machines.

Again, I do not know where Albrecht got his information, because I do not recall making any other statements than the ones above. It is true, of course, that if one has a computer with only 8, 12, or 16 K memory, there isn't much chance of using that machine for all the requirements of an information retrieval system. But one can prepare tapes of data at small installations and then have these processed at some larger machine in the vicinity. There are, according to a survey produced recently by the Association for Computing Machinery, medium to large-scale computers in every country except the most absolutely primitive, and in these, one can find ways to get processing done in relatively nearby areas. So, even if TAXIR were the memory hog that Albrecht thinks, it still is possible by proper systems approaches, to achieve the same results. Organization is the most important element, and we've done a lot of thinking about this aspect, something many people do not do

I had a pleasant visit last week with C. E. (Earl) Jones, the ADP systems offcer from the Department of Agriculture, New South Wales. It was good to talk to hime because of his wide-ranging knowledge of computing systems, their limitations, management, and a pretty good knowledge of information problems with wheat. As I understand it, the Agricultural Department of NSW has been charged with the maintenance of a wheat genetic resources center for all of Australia, and Jones has been asked to provide the necessary computing backup for the center. He had heard of TAXIR from several sources, but did not know of the interests of the international program in TAXIR. He seemed to appreciate the significance of TAXIR, and may decide to contract with us to get TAXIR running in Sydney. If he does, then TAXIR will be available to any user in Australia, and that is the sort of arrangement I want to make--give the system (and training) to one group in a country, and then let the system spread from that group to others in that country.

I hope that by the time you receive this letter, you will have had a chance to see Jack, and find out about our various efforts. We want to get going on the pilot project as soon as possible.

Sincerely,

David J. Rogers

Sept. 5, 1972

Dr. Lewis Roberts
The Rockefeller Foundation
111 West 50th St.
New York 10020

Dear Dr. Roberts:

May I please have your assistance in identifying a member of the staff of the International Center in Mexico, in charge of the management of the files of data on the collections of genetic materials maintained there? Unfortunately, I do not have any of the publications which might identify the individual.

The reason I request this information is that I have been charged to organize a program on documentation and information management for genetic resource centers at the forthcoming FAO/IBP Technical meeting on Genetic Resources to be held in Rome in March, 1973. It would seem advisable to have some responsible individual from Mexico to speak on the problems of information storage and retrieval in a center where there is much activity and experience already available.

Your help in locating and identifying the most proble person in Mexico will be much appreciated.

Sincerely yours,

David J. Rogers
Professor of Biology

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME | Cables: FOODAGRI ROME | Telex: 61181 FOODAGRI | Telephone: 5797

Ref. AGPE - PL 2/8

SEP. 4 1972

Dear Dr. Rogers,

I am writing to acknowledge your letter of 17 August together with a proposal for a Pilot Project for Genetic Resources Centres.

Dr. León is at present on home leave and is not expected back in Rome until Monday, 11 September. However, on his return I will draw his attention to your deadline of 15 September.

Yours sincerely,

A. L. Zanibeni

Secretary to Dr. J. León
Crop Ecology and Genetic Resources Unit

Dr. David J. Rogers
Professor of Biology
University of Colorado
Boulder
Colorado 80302
U.S.A.

JOHN INNES INSTITUTE

COLNEY LANE, NORWICH, NOR 70F

Norwich 52571

BS/td

5th September, 1972.

Dr. D. J. Rogers,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

Dear Dave,

Many thanks for your letter of 7th August inviting me to participate in the Symposium on Crop Genetic Resources to be held in March 1973. Please accept my apologies for this delayed reply but I have been away on holiday.

I would be very happy to attend the Symposium and to give a talk on the lines that you suggest. I will give some thought to the title that you propose and let you know as soon as I can what sort of content I think would be appropriate. You can then let me have your comments before I prepare an abstract for FAO.

I am very pleased to learn that travel and daily expenses will be met by FAO or IBP since I would find it difficult to get finance from the A.R.C at what they would consider to be such short notice!!

Kind regards,

Yours sincerely,

B. Snoad.
Dept. of Applied Genetics.

The Rockefeller Foundation
111 WEST 50th STREET, NEW YORK, N.Y. 10020

AGRICULTURAL SCIENCES

CABLE: ROCKFOUND, NEW YORK
TELEPHONE: COLUMBUS 5-8100

September 8, 1972

Dear Dr. Rogers:

I would suggest that you contact Dr. Mario Gutierrez as the individual most knowledgeable and engaged in the maintenance of the corn germplasm in CIMMYT's gene bank.

His address is:

Dr. Mario Gutierrez
CIMMYT
Londres 40
Mexico 6, D.F., Mexico

Sincerely yours,

Lewis M. Roberts
Associate Director

Dr. David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302

LMR:cs

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref.

31 August 1972.

Dear Professor Rogers,

Thank you for your letter of 25 August. I am glad that you found my comments useful and that the users manual is in progress.

I have heard of your visit to Europe through various enquiries, one from Holland, one from the U.K. and one from Italy. Professor Porceddu of the Bari Laboratory called at my office some time ago and asked for a copy of the software documentation. I had also a request from Mr. Westcott of the Cambridge Plant Breeding Institute. Unfortunately our reproduction facilities are very limited as we have no high-speed machines. However, I have managed to make a second copy which I have now sent to Professor Porceddu and when he has finished with it (or copied it) he will send it to Cambridge.

I wonder whether the software documentation has yet been printed or whether further copies are available. I would like to be able to give enquirers an address where they could write for copies. After having lent my copy around numerous people two pages are missing and I wonder whether I could have a further copy of pages 38 and 197.

I will get in touch with Dr. Leon when he returns from leave and have a look at your proposal for a pilot project.

Our financial crisis continues and the prospects for developing large scale information systems in FAO in the biennium (1972/73) or the next (1974/75) are very remote. However, reduced funds may lead to greater thought being given to users and needs.

I shall look forward to your visit in March.

Yours sincerely,

John Wrigley

J. Wrigley
Chief, Computer Systems Branch

Professor David J. Rogers
Professor of Biology
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder
Colorado
U. S. A.

CSIRO

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600, CANBERRA CITY, A.C.T. 2601 TELEPHONE 48 7722 TELEGRAMS PLANTINDUSTRY CANBERRA TELEX 62351

AIR MAIL

OHF:JFW
Ref:

22nd August, 1972.

Dr. D.J. Rogers,
Department of Environmental Population
and Organismic Biology,
University of Colorado,
BOULDER. COLORADO. 80302.

Dear Dave,

Thank you very much for your letter of August 14. The programme looks fine, and I hope you'll get full acceptances. I know that Lothar Seidewitz will attend, and that his expenses are met by his institution. The only suggestion I want to make is that you give a brief introduction which prepares the audience for the programme as a whole. Otherwise they are likely to consider the papers as isolated contributions, rather than as parts of a whole. You could explain the nature of the problems and needs, and how the individual papers contribute to their solution.

As regards the Birmingham workshop, I have heard nothing from Jack except that it was successful, that some of the problems of description had to be brought up again because not everyone had been at Izmir, and that he needed money to recover at least some of your expenses. (Of this I had been aware for a long time, and at last IBP agreed to make available the $150 left to the credit of my activity, and you will have received this by now.)

However, I was glad to see your clarification of the origin and ownership of Taxir and the procedures for its use you recommend. Lothar Albrecht, who attended the meeting, gained the impression that the proposed training period would have to be rather long and hence expensive; something like a year was suggested. Secondly, that the storage capacity required for accommodating Taxir was very large, requiring a computer size usually out of reach for gene banks, especially since nowadays all or most computers are so much in demand that to get access for a very large programme was problematical. I suppose you have an answer to the latter.

Jack did not send me the recommendations hence I don't know about the pilot project but should I be able to see Jack in September in Birmingham, I'll hear about it. This trip is very rushed; unfortunately I shan't be able to drop over to visit either Cal - who sent me a warm invitation - nor you. I'll have only 6 days in England (where most of my family live) and may have a day visiting Jack. Then my wife - whom I meet in London - and I go for a long-planned and now much abbreviated holiday in Greece (mainly Crete) of only 2 weeks, and then for 10 days to Israel, partly duty, partly pleasure, and finally for a month with Jorge in Rome to prepare the FAO-IBP "survey of genetic resources in the field" for publication to be ready for the Conference.

.../2.

I wrote to you on August 3 that any letters to reach me after August 25 should be addressed c/- Jorge. However, anything you want me to see earlier could be sent to 30 Dunstall Road, London S.W. 20, until September 14, since we are leaving on the 15th.

Best regards.

Yours sincerely,

OHF

(O.H. Frankel)

THE ARID LANDS
AGRICULTURAL DEVELOPMENT
PROGRAM

THE FORD FOUNDATION
P.O. BOX 2379 BEIRUT, LEBANON
CABLE ADDRESS "FORDLEB" TELEPHONE 274346

August 28, 1972

Dr. David J. Rogers,
Professor
Department of Biology
University of Colorado,
Boulder, Colorado 80302,
U.S.A.

Dear Dr. Rogers:

I have received your invitation to participate in the FAO/IBP Technical Conference on Crop Genetic Resources. While I appreciate the invitation, I have mixed feelings about my participation and wish to mention this to you.

I am primarily interested in plant breeding. I worked in India from 1959 to 1971 when I was shifted to Beirut. I acted as joint coordinator of the All India Coordinated Sorghum Project and was active in plant breeding and experiment station operations. Ken Rachie had initiated collections of sorghum and millets in 1959 and I made extensive use of them in the breeding program. When Ken left India in 1966, I began the job of maintenance and expansion of the collections that he had begun. We continued to screen these collections for disease and insect problems and distributed seeds over the world. We became particularly involved with the USDA attempting to insure that a full set of the collections was in the USA and that all existing collections in the USA were incorporated in the so-called "World Collections". We have made mimeographed statements of the results of our screening, source information etc., but, I have not made any real study of information systems. Having worked in developing countries I am a bit concerned about the value of data processing equipment to them and feel that mimeographed information in their hands is valuable. I am not negative on data processing but wonder if it is sufficient. My hesitation to participate in the conference stems from two points; one, my primary interest is not in collections and related problems; and two, I am not at all familiar with data processing equipment and have not thought much about information systems. I have not been involved in past conferences on information systems except at Izmir and then was there for only two days.

Dr. David J. Rogers. August 28, 1972.

If you still feel that I can present to the conference information that you want, then I will seek the approval of my officers to accept your invitation. If you now feel that I may not be as qualified as others then please feel no embarrassement in requesting someone else to participate. I know that you want a good meeting.

Jack Harlan is head of a committee on sorghum and millet germplasm collection and preservation (I happen to be on this committee). He has worked with the sorghum collection and developed a new system of classification. Jack has been involved in several FAO conferences on the topic of germplasm collection, description and preservation. I can present the name of Jack Harlan as an individual whom you might wish consider.

Sincerely yours,

Leland R. House

Leland R. House

Dr. Jack Harlan's Address:

Professor, Plant Genetics
Department of Agronomy (Turner Hall)
University of Illinois
Urbana, Illinois 61801
U.S.A.

The University of Birmingham

The University of Birmingham, P.O. Box 363,
Birmingham B15 2TT ENGLAND.
Telephone 021-472 1301

From: Professor J. G. Hawkes,
Department of Botany.

Dr. D. Rogers,
Dept. of Environmental Population
and Organismic Biology,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

B Ling 72

JGH/DMW

18th August 1972

Dear Dave,

Very many thanks for your letter and covering note of 14th August setting out your position very clearly with regard to TAXIR. I am glad you decided to send copies to Jorge León and Sir Otto Frankel but to no other people. This clarifies your position for them and makes it possible for us to arrange for co-operation on a sure footing.

I have just returned from Turkey so I shall be writing to you later at greater length on various other topics. Meanwhile, thanks again for your kind invitation to stay with you when we are at Boulder next year.

Yours ever,

Jack

J. G. Hawkes

August 14, 1972

Professor J. G. Hawkes
Department of Botany
The University of Birmingham
P. O. Box 363
Birmingham B15 2TT

Dear Jack:

I write to clarify some issues about the availability and restrictions on the computing system, TAXIR.

First, an historical account, to give some perspective. The more fundamental ideas for TAXIR were conceived over a period of a few years, starting in the early 1960's in New York, and later, in Colorado. I received a grant from the National Science Foundation in 1967, for a period of two years, during which time the major ideas were brought together, and the early version of TAXIR established. By 1970, the funds from the National Science Foundation were expended, and we were no longer funded from Federal or other governmental agencies to continue the development of the information retrieval system. The team of biologists, programmers and mathematician who had developed the initial version of TAXIR was disbanded, while some of my staff members turned to other projects where we did have funding. We were barely able to keep the information retrieval system alive, except the individuals in the former team, who took the system as we had it, with them. Some of them have developed the system further, and I have no control over their developments or applications, nor can there be any possible conflict of interest, nor claims that these individuals must give the system they now possess to anyone because it is in the public domain. This is true because any developments made by the individuals were not funded by any public money and are, therefore, at the discretion of the individual to apply or withhold as he sees fit. I do keep a copy of the initial version of TAXIR, but since I am not funded for this purpose, I cannot give the program away, unless someone is willing to enter into a contract to pay the costs of getting the program out of storage, and either running off a list of the program, or provide a tape.

We were fortunate that two of my former staff, who were no longer financed by my funds, were able to get employment with the Gulf Universities Research Consortium, which had a contract from the Mississippi Test Facility of NASA to take over the initial versions of TAXIR, and build it into a more efficient operating system under the acronym ENVIR. This version is greatly modified from the initial TAXIR, and does not fall under my jurisdiction, but is under the direction of the Gulf Universities Consortium (GURC). Since I worked for a few months as project coordinator for the development of portions of ENVIR (amongst several other important programs) I am familiar with that development, but again, am not in charge. This version is properly in the domain of all the 21 universities that make up the Consortium.

It is clear that I have a continuing interest in the development of TAXIR as a tool for the work of the genetic conservation centres. To accomplish this, I have a small working group, again not funded for purposes of TAXIR, but which keeps up with any developments we can, and to which we add our own updated versions when possible. None of this is under government sponsorship and is, therefore, not in the public domain.

Lest it appear that the above statements are in contradiction to my often stated position, let me assure you that this is not the case. I, as a scientist, amgreatly concerned that my products be put to use in the cause of scientific advancement, and to that end, I make my version available to anyone with whom there is a chance to work effectively. I have indicated this to the assembled members of the Workshop on Information Systems for Genetic Resources, held at the University of Birmingham, July 3 and 4, 1972. I am deeply concerned, however, that the system be appropriately applied, and to that end, ask that users receive intensive training in the proper application of a large and complex system. Since I am not funded to provide such training, it is my hope to enter into contract with those who would use the system, or that the prospective user enter into a similar contract with the Gulf Universities Research Consortium where it is possible to achieve similar ends.

Another concern of mine with respect to the use of TAXIR is that there are many concepts in addition to those dealing specifically with the computer program where training is necessary to make the most appropriate use of the system. Few people have looked more deeply into this aspect than I, and those who now work with ENVIR, namely Mr. Henry Fleming and Dr. S. G. Appan who are employees of GURC. I know that there are many different ways to contruct data so that all of the value of the information may be extracted. The nature of the descriptors for TAXIR, the varying ways in which one may instruct the system to store and retrieve the data, the structure of data banks, and the efficient management of these are items of great significance, not normally recognized by most scientists. We encourage potential users to again enter into some sort of contract to be given the most efficient training in these aspects.

Neither of the above types of training must be followed, but it is my experience that without the formal training, most people do not get full fenefit from the systems, and under these circumstances, may tend to criticize the system, rather than themselves.

To reiterate: the present version of TAXIR which is in my hands is not the same version that was developed with public money, and the version that was developed with public money is available to those who can pay the costs to have that version copied. I will make my later version available to those who have legitimate problems, at cost, without compensation to me. I urge those that would use the system be properly trained in both the data handling aspects and the computer program aspects. I believe this to be in the proper scientific spirit, and it should not be misunderstood that I am trying to make a financial profit from the sale of the system. As a Professor of Biology at the University of Colorado, I am not obligated by any regulation or law to provide service other than that required by the University. In the spirit of science, I offer these services where they will be most effective.

Lest it appear that this letter is an attempt to derive funds for the forthcoming development of the pilot study, let me set your mind at rest. I have a graduate student who will be assigned to test some of the ideas of the pilot study, using TAXIR, at no cost to anyone other than my own funds. If, in the future, we are successful in attracting appropriate financial support, then I will expect these funds to be used in part for those of our activities which are clearly identified as work for the development of the genetic resource centre information management system.

Sincerely yours,

David J. Rogers
Professor of Biology

August 14, 1972

Telephone: (303) 443-2211
extension 8598

Sir Otto Frankel
CSIRO
Division of Plant Industry
P.O. Box 1600
Canberra City, ACT

Dear Otto:

There are two enclosures: the proposed program for Section 7, Documentation, for the forthcoming FAO/IBP meeting in Rome, and a copy of a letter to Jack Hawkes.

The suggested program follows, to the best of my recollection, the recommendations from you and Jorge. I have sent letters of invitation to Snoad, Seidewitz and House, but so recently that I could not expect a reply yet. House should, as you suggest, provide his own expense money. When Snoad and Seidewitz reply, I'll ask for their projected financial requirements. You will note that Hersh is still on the program. We think that, because of receipt of a recent grant, we can get Hersh's money for the trip.

If the proposed program and speakers, enclosed, is not satisfactory, let me know.

The second enclosure, the letter to Jack Hawkes, I felt necessary because of some things that transpired earlier this year, and the letter attempts to "settle the dust". I believe you are aware of the circumstances which caused me to write the letter.

Have you seen the resolutions (or recommendations) made at the Workshop which Jack sponsored at Birmingham in July? I am almost certain that Jack will have told you and Jorge about the Workshop, which I thought to be very productive. One of the resolutions called for a pilot project to demonstrated the various necessary systems in information systems for genetic resources centres. I, and Hersh, are presently at work on a proposal for the pilot project. When we have finished our part, we will forward it to Hawkes for his input, and then I am sure that you and Jorge will have your say about the proposal.

If, on your travels in the US, you expect to be anywhere near Colorado, please stop in. I have given my office phone above. My home phone is (303) 494-0805. Call me collect.

Sincerely,

David J. Rogers

Encl.: 2

August 14, 1972

Dr. Jorge Leon, Chief
Crop Ecology and Genetic Resources Unit
FAO
Rome

Dear Jorge:

There are two enclosures: a copy of a letter to Dr. Hawkes, and a copy of the proposed program for Section 2, Documentation for the FAO/IBP meeting in March.

I felt that it was necessary to send the copy of the letter to Dr. Hawkes to you, and to Sir Otto, but to noone else. I felt it was necessary to write this letter because of earlier events, of which you are aware. Hopefully, this makes my position clear.

The second enclosure, the proposed program, meets, I think, with yours and Sir Otto's recommendations. I assure you that if we do not have funds for Mr. Hersh (who is on the program) you will not be asked to meet his expenses. I think we have enough funds from an allied budget (of a grant we just received) to bring him along.

I have invited Snoad, Seidenditz and House, but so recently that I have not had a chance to hear from them. As soon as they have replied, I will notify you, and ask that they tell me about their needs for travel and costs. I expect that House can provide his own financial support from Rockefeller.

Have you seen the recommendations and resolutions that came from the Workshop which Jack Hawkes sponsored in Birmingham in July? I hope that Miss Bennett reported on that meeting, which was very successful. Acting on one of the resolutions, that a pilot project be inaugurated to test the various necessary information systems in depth, I am in the process of preparing a proposal for the pilot study. This proposal will be sent to Hawkes for his additional input, and then, I suppose that you will be included.

Sincerely,

David J. Rogers
Professor of Biology

Encl.: 2

August 9, 1972

Dr. L. R. House
Arid Lands Agricultural Development Program
Ford Foundation
P.O. Box 2379
Beirut, Lebanon

Dear Dr. House,

I have the pleasure to invite you to participate in a half-day symposium on documentation at the FAO/IBP Technical Conference on Crop Genetic Resources, to be held March 12-16, 1973, in Rome. I enclose a proposed outline of speakers and topics for the symposium, which has been approved both by Dr. Jorge Leon (FAO) and Sir Otto Frankel (CSIRO, Australia), the organizers and directors of the Conference.

We believe that, at previous conferences in Rome, Izmir, and Birmingham, England, sufficient agreement was reached on the types of information, the methods of information handling, and the computer systems, to make it possible to set forth a unified system for information management of genetic resources at the next Rome conference. This belief leads me to suggest the enclosed outline as a means to indicate that we have reached a final stage for international cooperation on the information management. Inasmuch as negotiations are going forward presently to attract funds from the World Bank for a series of gene banks to be established in the major centers of agricultural origin, it would seem to be useful to indicate that we have done our work in developing the necessary systems, and are ready to apply our knowledge and methods to the large problem of information which will be associated with each of the proposed international gene bank centers.

I have suggested that you be included in the half-day symposium because of your experience with information systems, especially with sorghum and millet, which you described so well at the Izmir conference last April. If you are willing to participate, you are asked to present a formal paper in 25 minutes, with approximately 5 minutes for discussion at the end. With the speakers listed, we can cover most of the necessary ground for all information management problems, though certainly not in exhaustive detail. Your discussion will be valuable as one with practical experience in an area not covered by the other speakers.

If you accept, you are expected to submit an abstract of no more than 500 words to FAO by November 30. IBP has undertaken to publish selected conference papers as one of its "synthesis" volumes. Mnnuscripts should

be supplied by the author not later than two months prior to the commencement of the conference.

I will appreciate early acceptance of this invitation, and look forward to your reply. Further details of the program will be forthcoming when I have heard more from Dr. Leon in FAO.

Sincerely,

David J. Rogers
Proffssor
Dept. of Biology

DJR:wsn

August 8, 1972

Dr. Lothar Seidewitz
Institut Pflanzenbau FAL
33 Braunschweig
Bundesallee 50

Dear Lothar:

I have been invited by Sir Otto Frankel and Dr. Jorge Leon to organize the 7th Section, Documentation, of the FAO/IBP Technical Conference on Crop Genetic Resources to be held in Rome 12 - 16 March, 1973. It is my pleasure to invite you to participate in a half-day symposium in Section 7, Documentation.

As you know, we reached substantial agreement on methods for information retrieval for genetic resources at Izmir and Birmingham. It is my hope that we can round out these agreements by discussions along the lines suggested in the enclosed outline. Restrictions in both time and money prevent longer discussion periods or the inclusion of more speakers.

I have invited you to participate in this symposium because of your long and valued experience with the problems of information management systems, and because I think you can do the best job of presentation in the area of the title I have suggested. The combined presentations should establish the definitive set of procedures for international cooperation in information management, and possibly, at the same time, present a blueprint for those in other agricultural endeavors to follow. The titles in the proposed outline are only tentative and suggestive, and I trust that you will not feel that you must use the suggested title. Any suggestion you care to make, if you decide to participate, will be welcome. Please keep in mind the objectives of the symposium, and the conference as a whole. I believe the major objectives to be: (1) we are agreed on the methods of information management (including the computer systems already developed) and (2) the type of information to be gathered at all levels of gene bank operation are substantially understood, and further, (3) we are ready to proceed in the international network of gene banks.

I do not have full details of funds for travel and support, nor of the exact schedule for our presentation, but expect to know some time soon.

If you could prepare for about 25 minutes of formal presentation, with about 5 minutes for discussion, we should have ample time for completion of the session, and a review of the whole information managment system. Authors will be required to supply an abstract of not more than 500 words in their own language, and FAO will prepare translations. Afstracts must be recieved at FAO not later than 30 November 1972. IBP has undertaken to publish selected conference papers as one of its "synthesis" volumes. Manuscripts should be supplied by authors not later than two months prior to the commencement of the conference.

I hope that you will be able to participate next March, and look forward to an early, affirmative response.

Sincerely,

David J. Rogers

Encl.: Outline of presentations

August 7, 1972

Dr. Brian Snoad
Department of Applied Genetics
John Innes Institute
Norwich

Dear Brian:

I have been invited by Sir Otto Frankel and Jorge Leon to organize the 7th Section, Documentation, of the FAO/IBP Technical Conference on Crop Genetic Resources to be held in Rome 12 - 16 March, 1973. It is my pleasure to invite you to participate in a half-day symposium in Section 7, Documentation.

As you know, we reached substantial agreement on methods for information retrieval for genetic resources at Izmir and Birmingham. It is my hope that we can round out these agreements by discussions along the lines suggested in the enclosed outline. Restrictions in both time and money prevent longer discussion periods or the inclusion of more speakers.

I have invited you to participate in this symposium because of your long and valued experience with the problems of information management systems, and because I think you can do the best job of presentation in the area of the title I have suggested. The combined presentations should establish the definitive set of procedures for international cooperation in information management, and possibly, at the same time, present a blueprint for those in other agricultural endeavors to follow. The titles in the proposed outline are only tentative and suggestive, and I trust that you will not feel that you must use the suggested title. Any suggestion you care to make, if you decide to participate, will be welcome. Please keep in mind the objectives of the symposium, and the conference as a whole. I believe the major objectives to be: (1) we are agreed on the methods of information management (including the computer systems already developed) and (2) the type of information to be gathered at all levels of gene bank operation are substantially understood, and further, (3) we are ready to proceed in the international network of gene banks.

As I understand, either FAO or IBP will support your travel and daily expenses, but I do not have details at the moment. Nor do I have a schedule of times, and cannot tell you the day or time of the documentation session.

If you could prepare for about 25 minutes of formal presentation, with about 5 minutes for discussion, we should have ample time for completion of the session, and a review of the whole information managment system. Authors will be required to supply an abstract of not more than 500 words in their own language, and FAO will prepare translations. Abstracts must be received at FAO not later than 30 November 1972. IBP has undertaken to publish selected conference papers as one of its "synthesis" volumes. Manuscripts should be supplied by authors not later than two months prior to the commencement of the conference.

I hope that you will be able to participate next March, and look forward to an early, affirmative response.

Sincerely,

David J. Rogers

Encl.: Outline of presentations

CSIRO

DIVISION OF PLANT INDUSTRY
1600 487722
P.O. BOX 109X CANBERRA CITY, A.C.T. TELEPHONE 4[illegible]X TELEGRAMS CORESEARCH CANBERRA

OHF:DMcC
Ref:

3rd August, 1972.

Professor D.J. Rogers,
Professor of Biology,
University of Colorado,
BOULDER. COLORADO 80302. U.S.A.

Dear Dave,

This is merely to tell you that the last mail receipt day for me before leaving for the United States and Europe will be the 25th of this month. Any communications from you after that date should go to Dr. Leon at FAO or to me C/- Dr. Leon at FAO. Jorge or his excellent secretary will contact me should this be required; they will have my addresses on the way. I shall arrive in Rome about October 12th but in the meantime I shall be travelling a good deal.

Best regards.

Yours sincerely,

OHF

(O.H. Frankel)

P.S. We should like to know financial requirements for your speakers tour long.

CSIRO

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600, CANBERRA CITY, A.C.T. 2601 TELEPHONE 48 7722 TELEGRAMS PLANTINDUSTRY CANBERRA TELEX 62351

OHF:JFW
Ref:

19th July, 1972.

Professor D.J. Rogers,
Professor of Biology,
University of Colorado,
BOULDER. COLORADO. 80302.

Dear Dave,

Thank you very much for your letter of July 13. I shall be happy indeed if you can manage financial support for Hersh to get him to the Conference. No doubt he would make a valuable contribution.

Please go ahead with inviting speakers - that is now your own responsibility. You will be in the best position to encourage them to prepare the kind of paper which will make the best contribution to your section - and later to the book. You will recall the provisions for abstracts and the final papers contained in Jorge's letter of invitation to you.

Best regards.

Yours sincerely,

OHF

(O.H. Frankel)

The University of Birmingham

The University of Birmingham, P.O. Box 363, Birmingham B15 2TT
Telephone 021-472 1301

From: Professor J. G. Hawkes,
Department of Botany.

Dr. D. Rogers,
Dept. of Biology,
University of Colorado,
Boulder,
Colorado 80302,
U.S.A.

JGH/DMW

28th July 1972

Dear Dave,

Thanks for your letter of 15th July. We were glad to have you at Birmingham and grateful to you for all you did. It was good to hear that you were well received at Kew and that you had an interesting time there. Perhaps we may co-operate with the Kew people in due course though I get the impression that their thinking and planning is as yet at a very preliminary stage.

I look forward to receiving suggestions for the ~~Biology~~ pilot project in due course, which I am sure will be extremely interesting. Meanwhile, I have heard from Sir Otto Frankel who has got Dr. E. B. Worthington to put up a little money for you to take care of your expenses. I enclose a cheque for $150 and I am collecting funds from other sources which I will pass on to you in due course. From these sources it may be possible to obtain something like £100 which will still, I am afraid, not be sufficient but will be better than nothing. I will keep in touch with you and let you know how things are going when the money has been received.

Best wishes,

Yours,

Jack

J. G. Hawkes

July 13, 1972

Dr. O. H. Frankel
CSIRO
Canberra City, A.C.T. 2601

Dear Otto,

I was very pleased by your letter of 27 June, on the matter of speakers. I did what I thought to be the political thing, and should not have. However, you and Jorge have set that political matter to rest, and we can proceed.

Brian Snoad is definitely one of the best contributors on matters of information systems that I have encountered anywhere. Let us put him on.

I understand yourposition with respect to Harsh. Considering your limited budget, we must indeed forget a contribution from him, unless I can find some independent means of supporting his travel. It is my opinion that his organizational and systems approach to the complexities of both gene bank operation, and the concomitant information systems would be appropriate. If you agree to let him speak, provided we find funds for his travel, I will be most appreciative. Yours is, of course, the final decision, and I will agreeably support that decision.

Your suggested half day for information retrieval is more than generous, considering the program as a whole.

A matter of procedure: Do you invite the speakers, or do I do it after your final approval? The speakers will be: Rogers, Snoad, Seidewitz and House. (Possibly Harsh, if above agreements can be reached).

We had a very successful workshop at Birmingham July 4-5. I was glad to attend, even though I put out my own scratch to get there. I think Jack Hawkes did a fine job.

Looking forward to your final word on the March meeting.

Best regards,

David J. Rogers
Professor of Biology

CC: Dr. Jorge Leon, FAO

DJR/jr

UNIVERSITY OF COLORADO

BOULDER, COLORADO 80302

Department of Environmental, Population and Organismic Biology

July 13, 1972

Dear Otto:

I was very pleased by your letter of 27 June, on the matter of speakers. I did what I thought to be the political thing, and should not have. However, you and Jorge have set that political matter to rest, and we can proceed.

Brian Snoad is definitely one of the best contributors on matters of information systems that I have encountered anywhere. Let us put him on.

I understand your position with respect to Hersh. Considering your limited budget, we must indeed forget a contribution from him, unless I can find some independent means of supporting his travel. It is my opinion that his organizational and systems approach to the complexities of both gene bank operation, and the concomitant information systems would be appropriate. If you agree to let him speak, provided we find funds for his travel, I will be most appreciative. Yours is, of course, the final decision, and I will agreeably support that decision.

Your suggested half day for information retrieval is more than generous, considering the program as a whole.

A matter of procedure: Do you invite the speakers, or do I do it after your final approval? The speakers will be: Rogers, Snoad, Seidewitz and House. (Possibly Hersh, if above agreements can be reached).

We had a very successful workshop at Birmingham July 4-5. I was glad to attend, even though I put out my own scratch to get there. I think Jack Hawkes did a fine job.

Looking forward to your final word on the March meeting.

Best regards,

David J. Rogers
Professor of Biology

Dr. O. H. Frankel
CSIRO
Canberra City, A.C.T. 2601

Copy to: Dr. Jorge Leon, FAO

INSTITUT FÜR PFLANZENBAU UND SAATGUTFORSCHUNG
DER FORSCHUNGSANSTALT FÜR LANDWIRTSCHAFT
BRAUNSCHWEIG-VÖLKENRODE
Direktor: Prof. Dr. D. Bommer

Genebank

Institut Pflanzenbau FAL 33 Braunschweig Bundesallee 50

BRAUNSCHWEIG, July 14th, 1972
Bundesallee 50
Fernruf 5961
Drahtanschrift: Landforschung Braunschweig
Station für Fracht- und Expreßgut:
Bhf. Braunschweig-Lehndorf

Unser Zeichen: Sei/sp
12-4

Professor
Dr. Dave Rogers
Information Sciences Project
Coordinator,
GURC Information Management
Center,
National Aeronautics and
Space Administration

Bay St. Louis, Mississippi 39520

USA

Dear Dave,

Under separate cover you will receive the report of the EUCARPIA conferences held at Izmir last April.

This is the rewritten form that also includes the changes suggested by Prof. C. F. Konzak. I kept the original form as it was but added the above mentioned changes. This way a comparison is possible.

I really do hope, regarding all of us, that this report will reach its completion soon.

With best regards I remain,

sincerely yours,

Seidewitz

(L. Seidewitz)

CSIRO

AIR MAIL

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600 CANBERRA CITY, A.C.T., 2601 TELEPHONE 48 7722 – TELEGRAMS RESEARCHLABS CANBERRA. TLX 62309

OHF:CK
Ref:

AUSTRALIA

27th June, 1972.

Professor D.J. Rogers,
Project Co-ordinator,
Gulf Universities Research Consortium,
GURC Field Office,
NASA/Mississippi Test Facility,
BAY ST.LOUIS, Mississippi 39520. U.S.A.

Dear Dave,

Thank you very much for your letter of June 7 a copy of which I saw in Rome a few days ago. It was possible for me to discuss the suggestions you made with our good friend Jorge León and we would now like to make the following suggestions which are by way of comment on yours.

First, we agree with your selection of topics and roughly with your order of participants. However it will definitely not be possible for us to finance more than one participant from the United States, or indeed from a far away country. We have therefore decided that unless Cal Konzak can be supported by an outside source we are unable to invite him. León has discussed possible support from IAEA with Sigurbjörnson and was definitely told that support for Cal could be forthcoming only if his visit to Europe were in connection with his sabbatical which he is thinking of spending at IAEA. A special trip could not possibly be supported. Neither León nor I had any other ideas and after this very categorical statement I feel that a letter from me to IAEA would scarcely serve a purpose.

Similar considerations apply to Dr Hersh. We think therefore that the list of speakers should include yourself, Seidewitz and House. Both of them seem very appropriate, and in financial terms easy to manage. We believe that Seidewitz would be financed by the Germans but at any rate would be inexpensive; and House is almost certain to be supported by Rockefeller.

In addition, would you consider Snoad? He made very good contributions at Izmir and might be a useful addition to your team. What do you think of this? Have you any other suggestions of people who can be obtained cheaply or gratis? I am afraid we have to be very careful with expenditure since our funds are strictly limited. If we had any more money to spend than we have, a high priority would have to be given to people from developing countries which so far are almost unrepresented on the programme as a whole.

Please let me know your views and send a copy to Jorge. Would you kindly indicate in your letter to me that you have done so.

Finally, we have tentatively allocated a half day session to your programme. I trust that this will be sufficient.

With best regards.

Yours sincerely,

OHF

(O.H. Frankel)

June 7, 1972
Ref. AGPE - PL 7/25

Dr. Jorge Leon, Chief
Crop Ecology and Genetic Resources Unit
FAO
Via delle Terme de Caracalla,
00100-Rome

Dear Jorge:

I am pleased to have your invitation to prepare that section of the FAO/IBP Technical Conference on Crop Genetic Resources dealing with Documentation. I enclose my letter, and proposed speakers written to Sir Otto.

I have some questions raised by your letter which seem to be important from the standpoint of logistics and costs.

From paragraph 2 of your letter, I interpret that the 12 contributors to sections 2-5 are the only ones you have financial resources for, and since Documentation is not included in sections 2-5 I interpret your statement to read that there are no financial resources to support the travel of any invited speakers for Documentation. Must I assume from this, then, that I should be the only representative for Documentation?

I trust that I have misinterpreted your letter, because there is certainly a need to have more than just one type of discussion on the subject of Documentation. I will go ahead, until I hear differently from you, with the assumption that I may put down a program including 4 or 5 speakers (including me as one of them), and further assume that some funds will be available to pay for travel and per diem, at least for some of them.

Please note in my letter to Sir Otto that Konzak feels that he can be supported by the people in Vienna, provided you or Sir OTTo ask for him. That would give at least one more speaker.

I trust that the program suggested is satisfactory, and I look forward to your approval.

Sincerely,

David J. Rogers
Project Coordinator

Please note that after [illegible]

G U
R C Gulf Universities Research Consortium

GURC Field Office • NASA/Mississippi Test Facility
Bay St. Louis, Mississippi 39520 • (601) 688-3760

June 7, 1972

Sir Otto Frankel
Division of Plant Industry
CSIRO
P.O. Box 1600
Canberra City, A.C.T. 2601
Australia

Dear Otto:

Following instructions given by Jorge Leon, I submit herewith a suggested program for the section on Documentation at the FAO/IBP Technical Conference on Crop Genetic Resources. I recall that you expected two presentations on documentation, one from me, one from Konzak. However, I would like to try to expand this section, at least by one more speaker, in order for you and others there to have the opportunity to hear Mr. Gilbert Hersh, the operations research specialist, on the subject of operations research as a guide to effective documentation systems.

I think that Konzak can get funding for his travel through the International Atomic Energy Commission in Vienna, if either you or Jorge will ask for the funding. Cal cannot do this himself. If Cal's money can come from this source, that should free funds for one more speaker on documentation.

On the suggested program, I have added three other speakers, each of whom I feel would contribute something to the understanding of the importance of documentation as a consideration in gene bank operations. For example, Appan's contribution has to do with methods of using the gene bank documentation to get more efficient plant breeding under way in a shorter period of time.

I trust that you can see the benefits sufficiently to allow these speakers to be supported. In this connection, have you had any conversations with the agricultural technical group of the Agency for International Development? They should, in my opinion, be eager to support something like this.

Sincerely,

David J. Rogers
Project Coordinator

ADDRESS AFTER JULY 1.
Dept. Biology, Univ. of Colorado, Boulder, Colo. 80302, USA.

June 7, 1972

Sir Otto Frankel
Division of Plant Industry
CSIRO
P.O. Box 1600
Canberra City, A.C.T. 2601
Australia

Dear Otto:

Following instructions given by Jorge Leon, I submit herewith a suggested program for the section on Documentation at the FAO/IBP Technical Conference on Crop Genetic Resources. I recall that you expected two presentations on documentation, one from me, one from Konzak. However, I would like to try to expand this section, at least by one more speaker, in order for you and others there to havee the opportunity to hear Mr. Gilbert Hersh, the operations research specialist, on the subject of operations research as a guide to effective documentation systems.

I think that Konzak can get funding for his travel through the International Atomic Energy Commission in Vienna, if either you or Jorge will ask for the funding. Cal cannot do this himself. If Cal's money can come from this source, that should free funds for one more speaker on documentation.

On the suggested program, I have added three other speakers, each of whom I feel would contribute something to the understanding of the importance of documentation as a consideration in gene bank operations. For example, Appan's contribution has to do with methods of using the gene bank documentation to get more efficient plant breeding under way in a shorter period of time.

I trust that you can see the benefits sufficiently to allow these speakers to be supported. In this connection, have you had any conversations with the agricultural technical group of the Agency for International Development? They should, in my opinion, be eager to support something like this.

Sincerely,

David J. Rogers

DOCUMENTATION SECTION
FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES

Speakers and subjects, in order of priority for support

1. Rogers, D. J.: Overview of documentation of gene bank information.

2. Konzak, C.: The most critical gene bank data, their structure, organization and efficient means to collect them.

3. Hersh, G.: (USA, Grad. School of Business, U. of Colo., Boulder), Operations research techniques as a guide to effective documentation systems for genetic resource information.

4. Siedowitz, L.: (Volkenrude), EUCARPIA gene bank information systems organization.

5. House: (Rockefeller, now in Lebanon), Information systems and experience with sorghums and millet.

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. AGPE - PL 7/25

Dear Dave,

I have pleasure in advising that approval has been given to proceed with arrangements for the FAO/IBP Technical Conference on Crop Genetic Resources which was a subject of discussions at the recent ad hoc meeting of the FAO Panel of Experts on Plant Exploration and Introduction at Beltsville. Travel support will be provided in equal shares by FAO and IBP, and FAO will also be responsible for the essential conference papers and simultaneous translation. The date of the conference has been fixed for 12-16 March 1973 in Rome.

... The enclosed programme outline, except for minor modifications, follows the draft agreed to at the Beltsville meeting. It shows the areas of responsibility which section conveners have agreed to undertake. It will now be their task to plan the programme in detail and to select and negotiate with prospective contributors. For your guidance, the funds available would permit support for about 12 contributors to sections 2-5 at an average of $1,000, i.e. $850 for travel and $150 for per diem. However, some contributors may be able to draw on national or institutional sources at least for part of their requirements, some may have other engagements in Europe, and some may contribute to more than one section. A scheduled meeting of the FAO Panel either immediately before or after the conference will bring its members to Rome.

Although travel costs must be taken into consideration - it would, e.g. not be possible to support a substantial number from Australia, Japan, or Western USA - we should ensure that the panel of speakers is broadly representative.

Sir Otto Frankel has undertaken to coordinate the scientific programme. It would be greatly appreciated if you would prepare and send to him (with an information copy to me) the proposed programme for your section, a list of selected speakers, likelihood of acceptance, financial requirements if known, and order of

Dr. David J. Rogers
Project Coordinator
Gulf Universities Research Consortium
Bay St. Louis
Mississippi 39520
U.S.A.

priority, as soon as convenient, but not later than 30 June 1972. This will greatly facilitate coordination of the programme and early decisions on participation and financial support. Any suggestions on the programme or the organization of the conference will be greatly appreciated.

The structure of the conference cannot be determined until section programmes are defined in outline. Of the ten half-days available, formal sessions at the beginning and end of the conference, country reports (3.2 and 6.2), and sections 1 and 6.1 are likely to take up at least three, leaving seven or less for sections 2-5 and 7. This should give you an idea of the scope for these sections.

It has been decided to reduce pre-conference working papers - which would constitute a substantial financial burden - to the minimum required by regulations. Authors will be required to supply an abstract of not more than 500 words in their own language, and FAO will prepare translations. Abstracts must be received at FAO not later than 30 November 1972.

IBP has undertaken to publish selected conference papers as one of its "synthesis" volumes. Manuscripts should be supplied by authors not later than two months prior to the commencement of the conference.

Would you kindly inform Sir Otto of your acceptance, and let him have any comments or suggestions you wish to offer.

With best regards,

Yours sincerely,

Dr. Jorge León
Chief
Crop Ecology and Genetic Resources Unit

25 May 1972

FAO/IBP TECHNICAL CONFERENCE
ON CROP GENETIC RESOURCES

Rome, 12-16 March 1973

SCIENTIFIC TOPICS

1. Surveys of Genetic Resources
   (organizers: Frankel, León)

2. Population Genetics - scientific aspects
   (organizer: Marshall)

   2.1 Methodology
   2.2 Population problems
   2.3 Population management, i.e. sorghum, maize, alfalfa

3. Exploration
   (organizer: Harlan)

   3.1 Descriptive methods of exploration
   3.2 Recent and proposed activities by countries

4. Evaluation
   (organizer: Bommer)

   4.1 Breeding aspects
   4.2 Methodology - International rust nurseries; protein and oil profiles; NMR; physiological resistance to environment; host/parasite relations - indexing

5. Conservation
   (organizer: Hawkes)

   5.1 Seed physiology
   5.2 Vegetative materials (meristem culture)
   5.3 Pollen
   5.4 Cell techniques
   5.5 Roots, tubers, rhizomes

6. Genetic Resources Centres
   (organizer: Frankel)

   6.1 International network
   6.2 Regional and national activities

7. Documentation
   (organizer: Rogers)

May 25, 1972

Sir Otto Frankel
Division of Plant Industry
CSIRO
Canberra City, A.C.T.
Australia

Dear Otto:

I was pleased to receive your letter with enclosures. I was glad to hear, though indirectly, from Evenson, whom I met in Hawaii two years ago, and whom I liked very much. Your attempt to make me look like a gullible so-and-so for left-wing propaganda that the poor people only get cassava probably resulted from one of my own statements to a similar effect in other parts of the world. I have been with a number of South American agricultural types who, when asked if there were any cassava in the immediate neighborhood, would inevitably reply that there wasn't any. But it was usually the case that from the point where I asked the agriculturist the question, I could throw a rock on the closest planting of the crop. I do not put Evenson in the same category with the South Americans at all, but merely thought that sometimes agricultural types are not as observant as they should be, and that is a fact in many parts of the world, including the USA. So much for cassava--I'm glad to know it is not a problem in Australia--yet.

After leaving Izmir, I was in Rome for three very full days. I enjoyed seeing my old friend Jorge Leon, for whom I have great respect both as a person and as a good scientist. I also talked at some length with Miss Bennet, and got along very well with her. We both seemed to be interested in getting on with the job, and she is probably as impatient as I am, which may explain why others don't seem to enjoy her at all. I was invited, while at FAO to give a short talk on TAXIR to a working committee on data management in the soil sciences. As a result of the short talk, I have had requests from three separate continents for further information on our system. One of the persons requesting information was Alan W. Moore, of the Cunningham Laboratory, St. Lucia, CSIRO. Do you know him? If so, you might mention our mutual interest in systems, and tell him of our hoped-for development for the genetic resources. I find myself with too many different requests for our system, and we must find some means by which I can share the systems I have with all those who need them. How?

I was glad to see the paper "Documentation of Genetic Resources" so well and succinctly stated. It should be an effective document, given all other factors being favorable.

Good luck at the UN Conference

AIRMAIL

CSIRO

DIVISION OF PLANT INDUSTRY

P.O. BOX 1600 CANBERRA CITY, A.C.T., 2601 TELEPHONE 48 7722 – TELEGRAMS RESEARCHLABS CANBERRA. TLX 62309

OHF:PT
Ref:

12th May, 1972

Dr. David Rogers,
GURC-MTF,
Bay St. Louis,
MISS. 39520 U.S.A.

Dear Dave,

I have now quite reliable evidence on the status of kassava in Australia. You may have been misled by very old information or you may have anticipated an, as yet, very uncertain future. When you suggested that it was "the poor people" in Australia who were growing and eating kassava you had fallen to ... left-wing propaganda. I enclose Evenson's reply to my enquiry which shows not only that he knows his kassava but also that he knows David Rogers.

It was indeed a pleasure to meet you and I enjoyed our conversations. ... The further enclosure shows you that in drafting the recommendation to TAC on documentation we followed closely your own recommendations, except for the appointment of another biologist which in view of the paper we had already given TAC was really not possible. In this document we had listed documentation as one of the duties of the three-man secretatiat which we recommended. However, the sum of $40,000 for consultants etc. could be large enough to appoint yet another person at a more junior level should this be absolutely essential.

I discussed the recommendation with Sir John Crawford a day or two ago. He had not had time to read it previously but when I explained the purpose to him he was reasonably sympathetic. However, it seems that the recommendation to be made to the "Consultative Group" which will finally say "yes" or "no" to the project as a whole, will be a good deal more modest in financial terms than what we had recommended. The top priority will go to the Coordinating Organization, which is in line with my own recommendation to TAC. Without it there can be really no progress on a global scale, but only little bits and pieces on the lines of recent years.

I find it therefore distressing that recommendations to the UN Conference on the Human Environment, which I have just received, do not recommend such a coordinating organization at all but recommend to governments to set up genetic resources centres at a national level. Such recommendations have been made for the last 10 or 15 years and have been fairly ineffectual. The role of FAO which the UN Conference envisages is minimal and almost accidental. I can understand the history of all this but it is quite contrary to my own conference paper which I wrote for the Secretariat.

.../2

All the same, the Secretary-General has invited me to come to the conference as a consultant to the Secretariat and I have accepted. This was a rather hard decision to make since the conference itself will no doubt be exceedingly boring and the chance of doing good there will be slight or non-existent.

Best wishes.

Yours sincerely,

OHo

(O.H. Frankel)

The Collection, Evaluation and Conservation of
Plant Genetic Resources

Report of the TAC *ad hoc* Working Group held in Beltsville, U.S.A.
20-25 March, 1972.

Documentation of Genetic Resources

The need for appropriate and, as far as possible, integrated records and retrieval systems is generally recognized. It was mentioned in the Guidelines for the *ad hoc* Working Group (8 (a) (ii)), was recognized during the Working Group's discussions, and referred to in the Report under 33, 11, 34, 47.16 and 50.6. However, firm recommendations on organization and budgetary requirements were deferred in the expectation that a meeting of specialists on documentation of crop data, to be held at Izmir shortly after the Beltsville meeting , would resolve the long-standing difficulties and disagreements on descriptive, procedural and programming approaches. A brief reference to the omission of this important subject was to be made in a note to the Budget proposals, but was inadvertantly omitted.

At the Izmir meeting, a large measure of agreement was reached among representatives of four genetic resources centres (Izmir, Bari, Volkenrode and IRRI) and a number of specialists from U.S.A. and U.K. The four members of the *ad hoc* Working Group present - Bommer, Chang, Frankel and Hawkes - considered that the proposals which emerged from this meeting were likely to be widely acceptable in principle, and therefore presented a basis for active preparations at the institutional and regional level, and for international participation in assisting and guiding these efforts with a view to achieving a large measure of international compatibility and co-operation. Indeed, participation at international level had now become not only possible but essential. With the help of two of the experts mainly involved in preparing the groundwork for the proposals, Drs C.F. Konzak and D.J. Rogers, the outline of the following notes was prepared by the four *ad hoc* Working Group members present:

Documentation is an integral component of every operation, from surveys and collecting to evaluation and conservation. This input and output of information is essential for the effective use of all kinds of genetic resources. The larger the volume of information, and the larger the circle of users throughout the world, the greater is the need for systematic collection and dissemination of information. Computer procedures can now cope with the large volume of data which have been accumulated and which are rapidly growing.

Documentation is essential for the operations of all collections - from specialized genetic stocks in a research institute, to collections at regional centres or world collections such as those of rice, corn, wheat or sorghum. The same principles of classification and description can be applied to computer tapes or discs and to manually operated card systems, as long as the latter are made available in machine readable form.

Major documentation centres are essential for the functioning of a global network. Examples are the data banks at Beltsville and at 5 regional centres in U.S.A., at Volkenrode, Bari, Izmir (proposed), Lenningrad, Canberra, New Delhi, and at the International Rice Research Institute.

The need for documentation being generally recognized, and preparations proceeding in many places, it is considered important and urgent that guidance in planning and operations be provided at an international level, so as to secure efficiency of operations at all levels, and to lay the foundations and prepare the ground for international compatibility which is essential for the establishment of a global network of information at a later stage. For this purpose it is proposed to set up as part of the co-ordinating staff a small unit whose tasks it should be to assist in the establishment of data banks, to regulate the flow of information between them and from smaller institutions to documentation centres, and to explore the needs and generate plans, for global documentation centres which may be established in the future.

The principal member of this unit should be an operations research specialist, who should have the closest co-operation of the biologists on the staff of the co-ordinating unit. Financial provision is proposed for the appointment of short-term consultants to assist individual gene banks, to advise and develop computer procedures, to assist in the standardization of procedures essential for global functioning. Funds will be required for computer time for trial runs, and for extensive travel. The following budget proposals are made:

Salary	$25,000
Travel	10,000
Secretary	8,000
Consultants, assistance to data banks, computer time for trial runs etc.	40,000
	$83,000

This proposal should be visualized in the first instance as a two-year project, subject to review in the second year of operations.

TELEPHONE: 71 1377

University of Queensland

DEPARTMENT OF AGRICULTURE
ST. LUCIA, BRISBANE, Q. 4067

PROFESSOR E. J. BRITTEN,
M.Sc., PH.D.

3rd May, 1972.

Dr. O.H. Frankel,
C.S.I.R.O.,
P.O. Box 1600,
CANBERRA CITY, 2601.

Dear Dr. Frankel,

Thank you for your letter of May 1 concerning cassava in Australia.

David Rogers is a very forceful character and doubtless made his statement on cassava acreage in northern Australia with considerable assurance. However, his information is slightly astray. Cassava came under scrutiny as a source material for power alcohol in 1925 when estimates showed that it could produce 39 gallons of alcohol a ton compared with 23 gallons a ton from sugar cane. Towards the end of 1925 a large importation of cassava stocks for planting was made from Java in order to establish an industry in Queensland. More than 100 acres were planted in the Mackay district and subsequent plantings were made in Bundaberg and Rockhampton. In 1926 the power alcohol factory at Sarina opened but from the beginning the sugar industry supplied the bulk of all the material and as cassava was grown by cane farmers, the area under cassava declined and by 1929 it had ceased to be a commercial crop. References to this early work are to be found in the Queensland Department of Agriculture and Stock Annual Reports from 1924 until 1929.

Cassava now remains only as an ornamental crop but many farmers still remember having eaten it as children.

Ross Downes will have told you of our interest in the crop at Queensland University. The work at present is only just beginning but we feel that the crop warrants a closer look under modern agronomy. I hope this information will prove of interest to you. If there is anything else you would like to know, I would be happy to help.

Yours sincerely,

J.P. Evenson,
Senior Lecturer in
Tropical Agronomy.

Section 7 - Documentation

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES

ROME, ITALY

12 - 16 March, 1973

Outline and Suggested Titles

1. Dr. Brian Snoad:	The most critical gene bank data, their structure, organization and efficient means to collect them.
2. Dr. Lothar Seidewitz:	EUCARPIA gene bank information systems organization.
3. Dr. L. R. House:	Information systems and experience with sorghums and millet.
4. Mr. G. Hersh:	Operations research techniques as a guide to effective documentation systems for genetic resource information.
5. Dr. D.J. Rogers:	~~Review~~ Requirements of information management systems for genetic resource data.

Section 7 - Documentation

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES

ROME, ITALY

12 - 16 March, 1973

Outline and Suggested Titles

1. Dr. Brian Snoad:	The most critical gene bank data, their structure, organization and efficient means to collect them.
2. Dr. Lothar Seidewitz:	EUCARPIA gene bank information systems organization.
3. Dr. L. R. House:	Information systems and experience with sorghums and millet.
4. Mr. G. Hersh:	Operations research techniques as a guide to effective documentation systems for genetic resource information.
5. Dr. D.J. Rogers:	Review of information management systems for genetic resource data.

Section 7 - Documentation

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES

ROME, ITALY

12 - 16 March, 1973

Outline and Suggested Titles

1. Dr. Brian Snoad:	The most critical gene bank data, their structure, organization and efficient means to collect them.
2. Dr. Lothar Seidewitz:	EUCARPIA gene bank information systems organization.
3. Dr. L. R. House:	Information systems and experience with sorghums and millet.
4. Mr. G. Hersh:	Operations research techniques as a guide to effective documentation systems for genetic resource information.
5. Dr. D.J. Rogers:	Review of information management systems for genetic resource data.

Section 7 - Documentation

FAO/IBP TECHNICAL CONFERENCE ON CROP GENETIC RESOURCES

ROME, ITALY

12 - 16 March, 1973

Outline and Suggested Titles

1. Dr. Brian Snoad:	The most critical gene bank data, their structure, organization and efficient means to collect them.
2. Dr. Lothar Seidewitz:	EUCARPIA gene bank information systems organization.
3. Dr. L. R. House:	Information systems and experience with sorghums and millet.
4. Mr. G. Hersh:	Operations research techniques as a guide to effective documentation systems for genetic resource information.
5. Dr. D.J. Rogers:	Review of information management systems for genetic resource data.