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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.

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.

September 12,1972

Mr. John Wrigley
Chief, Computer Systems Branch
FAO
Via delle Terme di Caracalla,00100-Rome
Italy

Dear Mr. Wrigley,

Enclosed are the two pages which were missing from your copy of the TAXIR documentation. I hope that when Jorge Leon returns from leave that you can ask him to share with you not only the proposal for the Pilot Project but also a statement which explains our position vis a vi TAXIR. This will help you understand the means by which we can share TAXIR.

I can understand that FAO is in a finnancial bind. However, I hope that you can understand that I too am in a finnancial bind. For instance, this institution does not pay postage for this letter and I take it out of my own pocket. My recent trip to Birmingham was largely self finnanced.

The statement in Dr. Leon's office about TAXIR will explain why I can not give out any more listings and documentation of the system.

Sincerely,

David J. Rogers
Professor of Biology

DJR /CR

PROGRAMA COOPERATIVO DE INVESTIGACIONES EN MAIZ

UNIVERSIDAD AGRARIA - LA MOLINA

APARTADO 456
LIMA PERU
CABLE UNIAGRARIA

La Molina, 8 de Octubre de 1973
PM-685/73

Señor Dr.
Jorge León
Organización de las Naciones Unidas para la
Agricultura y la Alimentación (FAO)
Via delle Terme di Caracalla, 00100
Roma
ITALIA

Estimado Jorge:

Recientemente, tuve oportunidad de participar en la Reunión de Trabajo de Encargados de Bancos de Plasma Germinal de Maíz, realizada en el CIMMYT de México.

Como resultado de esta reunión, nos hemos interesado en el Método TAXIR, que es muy conveniente para tener los datos en forma ordenada y obtener fácilmente cualquier información respecto a éllos y afines con el almacenamiento de la semilla.

Como tú sabes, en La Molina existen varios Bancos de Germoplasma como el de Maíz, Papa, y algunos otros están siendo implementados y están creciendo a ritmo acelerado, como Ají, Tomate, Quínua, Frutales, Frutales Nativos, Yuca, etc. Todas las personas encargadas de estos Bancos están interesados en aplicar el método TAXIR para manejar su germoplasma.

El interés demostrado por los encargados de los Bancos de aplicar el método TAXIR nos ha creado la necesidad de tener personal preparado para la aplicación de dicho método; por lo cual, queremos ver qué posibilidades habría de que nos ayudes a enviar a alguna persona a la Universidad de Colorado para que se perfeccione en el método antes mencionado.

Otro problema que estamos preveyendo, si es que empiezan a funcionar todos los Bancos con volumenes grandes, es la capacidad de nuestro sistema de computación IBM 1130, el cual dá servicio a toda la Universidad, así como a otras instituciones del sector público.

PROGRAMA COOPERATIVO DE INVESTIGACIONES EN MAIZ
UNIVERSIDAD AGRARIA - LA MOLINA
APARTADO 456
LIMA PERU
CABLE UNIAGRARIA

Estamos pensando en el Centro de Estadística y Procesamiento de Datos (CEPDA) de la Universidad Nacional Agraria, cambiar nuestro sistema a una 360-40 ó una 370-145 para poder cumplir con estos nuevos trabajos, pero dificultades presupuestarias no nos permiten hacerlo por el momento.

Conociendo el alto cargo que ocupas dentro de la Comisión de Bancos de Germoplasma de la FAO, te hago llegar nuestras inquietudes y problemas, en esta carta, esperando que nos puedas ayudar y aconsejar para poder solucionar algunos de los problemas relacionados con la instalación y modernización de nuestros Bancos de Germoplasma.

Te saluda

Atentamente,

Wilfredo Salhuana M.
Genetista del Programa de Maíz
Director del CEPDA

WSM/el

United States and International Development Agencies Supporting Improved Food Crops Production...Including High Protein Crops

PRIVATE ORGANIZATIONS, FOUNDATIONS AND AGRIBUSINESSES

FOUNDATIONS
- FORD (CIMMYT, IITA, CIAT, IRRI, ALAD, ICRISAT, CIP)
- KELLOGG (CIAT)
- NEAR EAST
- ASIA
- ROCKEFELLER (CIMMYT, IITA, CIAT, IRRI, ICRISAT, CIP)
- FULBRIGHT (TRAINING)
- PAN-AMER. DEV. FOUNDATION

SOCIETIES
- AGRONOMY
- PHYTOPATHOLOGY
- ASIA

INTERNATIONAL VOLUNTARY SERVICES (IVS)
NATIONAL ACADEMY OF SCIENCES
AGRIC CHEMICAL COS.
SEED IMPROVEMENT COS.
FARM MACHINERY COS.
FOOD PROCESSING COS.
PRIVATE RESEARCH SUPPORTING ORGANIZATIONS
COOPERATIVE LEAGUE OF THE USA (CLUSA)
AGRICULTURAL COOPERATIVE DEVELOPMENT INSTITUTE (ACDI)

INTERNATIONAL ORGANIZATIONS

- UNITED NATIONS DEVELOPMENT PROGRAM (UNDP)—CIP, ICRISAT, WARDA
- FOOD AND AGRICULTURE ORGANIZATION (FAO)
- INT. BANK FOR RURAL DEVELOPMENT (IBRD)—ICRISAT
- UN EDUCATIONAL, SCIENTIFIC AND CULTURAL ORG. (UNESCO)
- ASIAN DEV. BANK (ADB)
- INTER-AMERICAN DEVELOPMENT BANK
- ORG. OF AMERICAN STATES (OAS)
- SOUTHEAST ASIAN DEVELOPMENT AGRICULTURAL GROUP (SEADAG)
- CENTO
- COLOMBO PLAN

U. S. GOVERNMENT AGENCIES

FEDERAL

DEPT. OF STATE
AGENCY FOR INT. DEV. (AID)
- TECH. ASSIST. BUREAU (TAB)
  - AGRIC. AND FISHERIES OFFICE
  - NUTRITION OFFICE
- REGIONAL BUREAUS AND COUNTRY DESKS
  - LA (Brazil, Mic., etc.)
  - AFR (Nigeria, Tunisia, etc.)
  - ASIA (Turkey, India, etc.)
  - SUPPORTING ASSISTANCE (SA) (Vietnam, Cambodia, Thailand, Laos, Burma, Jordan)
- COUNTRY MISSIONS
  - LA (15)
  - AFR (11)
  - ASIA and NEAR EAST (9)
  - SA (6)

PEACE CORPS
DEPARTMENT OF AGRICULTURE (USDA)
- REGIONAL PULSE IMPROVEMENT (PASA RA (AJ) 3-60
- PLANT AND SEED MATERIALS (PASA (AJ) 2-69
- EAST AFRICA MAJOR CEREALS PASA
- WEST AFRICA MAJOR CEREALS PASA
- PL480 RESEARCH**

DEPARTMENT OF INTERIOR
BUREAU OF RECLAMATION
TENNESSEE VALLEY AUTHORITY (TVA)
U. S. GEODETIC SERVICE (USGS)

STATES

UNIV. AND EXPT. STA.
NEBRASKA (Lincoln)
- WHEAT PROTEIN* (AID-1208) World-wide
- SORGHUM PHYS. (Rockefeller)
- SORGHUM PRODUCTION

PURDUE (Lafayette)
- CORN PROTEIN (AID-2809) (World-wide)
- SORGHUM PROTEIN (AID-1175) (World-wide)
- SORGHUM PRODUCTION (Brazil)

ILLINOIS (Urbana)
- SOYBEAN PRODUCTION AND IMPROVEMENT (India)
- SOYBEAN FOOD UTILIZATION (AID-3292) (Worldwide)

KENTUCKY
- THAILAND

OREGON (Corvallis)
- WHEAT PRODUCTION Turkey, Jordan

NORTH CAROLINA* Uganda (NCATSU)
WYOMING
- AFGHANISTAN

TENNESSEE
- INDIA

KANSAS STATE
- NIGERIA, INDIA

HAWAII
- PHILIPPINES, THAILAND, LAOS
- EAST-WEST CENTER

GEORGIA

FLORIDA
- FIBERS (Monograph)

Puerto RICO
- PLANT AND SEED MATERIALS
- SORGHUM, FOOD LEGUMES, ROOT CROPS

MISSISSIPPI
- INDIA

OHIO
- INDIA/UGANDA

PENNSYLVANIA
- INDIA

MISSOURI
- INDIA

WASHINGTON*
- PAKISTAN

OKLAHOMA*
CALIFORNIA*
NEW YORK*
COLORADO*
ARIZONA*
Winter wheat—seed increase and preliminary evaluation of IWWYN entries.
WEST VIRGINIA
- Uganda

TEXAS
- Dominican Republic
- Vietnam

CONTRIBUTING NATIONS

AUSTRALIA
BELGIUM
CANADA* (IITA, CIAT, CIMMYT)
CHINA
DENMARK
FRANCE* (WARDA)
GERMANY* (CIP)
ITALY*
JAPAN* (SEADAG)
NETHERLANDS (CIAT, CIP)
POLAND*
RUSSIA*
SWEDEN*
TAIWAN
USA* (IITA, CIAT, CIMMYT, IRRI, CIP)
UNITED KINGDOM* (WARDA, EAAFRO, CIP, ICRISAT)
ROMANIA*
AUSTRIA*
BULGARIA*
CZECHOSLAVAKIA*
FINLAND*
HUNGARY*
IRAN*
IRAQ*
SWITZERLAND*
YUGOSLAVIA*

Crops Development Program Linkages

LATIN AMERICA

International

- WORLD-WIDE
  CIMMYT (Corn and Wheat Improvement Center, Mexico)
  Wheat and Corn
  CIAT (Tropical Agricultural Center, Colombia)
  Corn, Rice, Legumes, Roots, Beef and Swine
  CIP (Potato Research Center, Peru)
  Potatoes
  Plant and Seed Materials (USDA Nat'l Research Center, Beltsville, Md. & Mayaguez, Puerto Rico
  All Crops
- REGIONAL
  FOOD LEGUMES IMPROVEMENT
  Puerto Rico, USDA, AID
  Beans, Cowpeas
  CENTRAL AMERICAN CROP IMPROVEMENT PROGRAM (PCCMCA)
  CIMMYT
  Corn, Sorghum, Legumes
  IICA (Inter-American Institute for Agricultural Sciences, Costa Rica) Legumes

Countries

ARGENTINA*
Wheat and Corn—CIMMYT
BOLIVIA
Wheat—CIMMYT
BRAZIL*
Corn and Sorghum—Purdue Univ.
Wheat-Ford, Massey-Ferguson, FAO, UNDP
CHILE*
Wheat
COLOMBIA (ICA)
Cassava, Rice, Corn, Legumes, Sorghum, Wheat—CIMMYT, Purdue
COSTA RICA (ICA)
Legumes—USDA, Puerto Rico
DOMINICAN
Legumes
ECUADOR
Rice, Corn, Legumes, Wheat
EL SALVADOR
Corn, Legumes
GUATEMALA
Sorghum, Corn, Legumes
GUAYANA
Rice (FAO)
HONDURAS (EL ZOMORANO)
Legumes—IICA, USDA
MEXICO (INIA)
Wheat, Corn, Sorghum, Beans—CIMMYT, Nebraska, Purdue
NICARAGUA
Sorghum—CIMMYT, Purdue
Corn—CIMMYT
Beans—USDA, IICA
PANAMA
Legumes
PARAGUAY
Wheat, Soybeans
PERU
Potatoes, Wheat (CIMMYT)
USA (Puerto Rico)
Beans, cowpeas, sorghum, yams, etc.
DOMINICAN REPUBLIC
Legumes, Cereals

EAST ASIA

International

- WORLD-WIDE
  IRRI (Rice Research Institute, Philippines)
  RICE
- REGIONAL
  MEKONG VALLEY AUTHORITY
  Laos, Cambodia, Thailand and Vietnam
  SOUTHEAST ASIAN AGRIC. COLLEGE
  Philippines
  SOUTHEAST ASIA CORN IMPROVEMENT CENTER (SACP) (Thailand, Rockefeller)
  Corn, sorghum, soybeans

Countries

INDONESIA
Rice—IRRI
CORN—Rockefeller
Sorghum—Purdue
Soybeans—Illinois
KOREA
Rice—IRRI
Sorghum—Purdue
Wheat, Barley—Nebraska, CIMMYT
LAOS
Rice—IRRI
PHILIPPINES
Corn—Rockefeller and Ford Foundations, UNDP
Sorghum—Rockefeller and Purdue
Rice—IRRI, UNDP
THAILAND
Corn—Rockefeller
Rice—IRRI, Rockefeller
Sorghum—Rockefeller, Purdue
Soybeans—Japan, Illinois, UNDP/FAO
All Crops—NE Center (Kentucky)
VIETNAM
Rice—IRRI, Korea, Taiwan
Soybeans—Illinois
Sorghum—Purdue, Texas
Corn—Texas

NEAR EAST AND SOUTH ASIA

International

- WORLD-WIDE
  ICRISAT (Crops Research Institute for Semi-Arid Tropics, India)
  Sorghum, millet, pigeon peas, chick peas
- REGIONAL
  ALAD (Arid Lands Agricultural Development, Lebanon)
  Cereals, Legumes

Countries

NEAR EAST
TURKEY*
Wheat—Rockefeller Neb., Oreg., FAO
Sorghum—Purdue
IRAN
PULSES—FAO
Wheat—Nebraska, FAO, UNDP CIMMYT
Rice—IRRI, FAO
LEBANON
Cereals—Ford
ISRAEL
Research PL480/USDA
JORDAN
Wheat—Oregon

SOUTH ASIA
AFGHANISTAN*
Wheat—Nebr., FAO Wyoming, CIMMYT, USDA
Corn—CIMMYT
BANGLADESH
Relief Activities
INDIA (Ill., Ohio, Kan., USDA, Tenn., Miss., Ill., Penn.,
Wheat—Ford, USDA,** Rockefeller
Legumes—USDA, Ill., Rockefeller, CLUSA
Millet—Rockefeller Ford, USDA**
Sorghum—Rockefeller Ford, USDA**
Rice—IRRI, Rockefeller, USDA**
NEPAL
Wheat—Neb., CIMMYT
Rice—IRRI
Corn—CIMMYT, FAO
PAKISTAN
Wheat—Neb., Ford, CIMMYT
Rice—IRRI, Georgia
Legumes—USDA,** WASHINGTON
Corn, Sorghum, Millet, —Purdue, Ford

AFRICA

International

- WORLD-WIDE
  IITA (Tropical Agricultural Institute, Nigeria)
  Corn, Rice, Legumes, Roots and Tubers
- Regional
  MAJOR CEREALS RESEARCH (USDA/PASA)
  WEST AFRICA (15 countries)—sponsored by Sc. Tech., Res. Commission (STRC), Lagos
  Corn, Sorghum, Millet—Ford, Rockefeller, AID
  EAST AFRICA (3 countries)—sponsored by East African Agricultural and Forestry Research Organization (EAAFRO), Nairobi
  Corn, Sorghum, Millet, Legumes—Rockefeller, Ford, AID
  WEST AFRICAN RICE DEVELOPMENT ASSOCIATION (WARDA)
  Liberia, Sierra Leone, Ghana, Guinea, Gambia, Niger, Nigeria, Senegal, Ivory Coast, Mali, Togo with administrative headquarters at Monrovia
  Rice—IITA, FAO, UNDP, France, UK, Netherlands, AID
  NORTH AFRICAN WHEAT PRODUCTION—Tunesia, Morocco, *Algeria
  Wheat, Barley, Annual Medicagos—CIMMYT, AID, Ford, Near East

Countries

GUINEA UNDP
Rice
ETHIOPIA
GHANA
Rice, Corn-FAO, IITA
KENYA
Corn, Sorghum, Millet—USDA, Rockefeller, AID
LIBERIA
Rice—IRRI, IITA, UNDP, FAO, WARDA, AID
MALI
Rice—UNDP
MOROCCO
Wheat—CIMMYT, AID
NIGERIA
Corn—USDA, IITA, CIMMYT, AID
Sorghum—USDA, Purdue, Rockefeller
Soybeans—Illinois, IITA
Rice—IRRI, IITA
ZAIRE
Corn—CIMMYT
Rice—Taiwan
SOMALI
TANZANIA
Sorghum, Millet, Legumes USDA, AID
Rice—IRRI, IITA
TUNISIA
Wheat—CIMMYT, AID, For[illegible]
UGANDA
Sorghum, Millet, Legumes USDA, Rockefeller, Pur[illegible]
UNITED ARAB REPUBLIC
Cereals-Ford
FAO, CIMMYT

* International Winter Wheat Performance Nursery (IWWPN) cooperators. Specific cooperation with Germany, Yugoslavia and Switzerland include disease evaluations of germplasm and regular nursery entries of the IWWPN trials and with Canada providing winter-hardiness evaluations.

** USDA Research with PL 480 funding

FAO Filecopy

Dept. EPO Biology
Univ. of Colorado
Boulder, Colo. 80302
Nov. 28, 1973

Dr. J. Wrigley, Chief
Computer Systems Branch
FAO
Rome

Dear Dr. Wrigley:

Thank you very much for your letter of 7 November (which we received 26 November). News of your change to an IBM 370 system is indeed welcome, for reasons below.

It is my hope, though not yet confirmed, that I shall be working in FAO, in the Crop Ecology and Genetics Resources Unit starting early next year. Details of my job are exceedingly skimpy, so what I tell you may be completely incorrect. However--for what it's worth, I shall be in charge of development of an information network for genetic resources centers around the world. At the moment, we expect TAXIR to be at the center of the system, but I assure you that TAXIR will have to demonstrate its advantages over other systems before final acceptance. I am not totally dedicated to any software package, including my own.

We are hard at work now with a very exhaustive documentation of TAXIR, in order that we may more readily transfer it to your facilities, if you so desire. I hope to twist the arm of the VP for Research of IBM, a personal friend of mine, to get his support in the conversion process. I will try to get him to provide us with a very good 370 systems man to work at IBM expense, hopefully in Rome. I have been training a systems programmer, (who is actually learning by documenting) on TAXIR, who I hope we can bring to Rome as our assistant in putting together the network. Clearly, we have a very large task on our hands, and I trust that we may cooperate to the fullest extent. I also anticipate use of my operations research-systems analyst to aid in the development. These two, plus various consultants as required, will aid us.

As yet, I have no information on the budget provided, but trust that sufficient thought has been given to it so that we can start with something approaching a realistic budget to accomplish the task. I am sure that my colleagues, however, do not have much of a grasp of "realistic" in your terms and mine!

In spite of the unknowns in the job which I listed above, I am looking forward to this very great challenge, for such an important goal. Thank you again for your kind letter. We shall be in touch shortly.

Sincerely

I am sending under separate cover a small user's manual developed here in Colorado.

Date: NOV 26 1975

To: DJR

From:

For: X your information

X your action

___ your signature

___ reply required

File instructions:

orig. DJR

copy 1 IN FILE

other copies: file in FAD

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.

7 November 1973

Dear Professor Rogers,

I have been meaning to write to you for some time. Although it is no real excuse we have had a very busy year. We made the decision to change equipment from Honeywell to IBM: we had to change machines anyway as the Honeywell system we had was no longer supported. In the end we decided to move to an IBM 370/135 and after the usual hard labour and adventures converting our programmes we started production work on 1 October on the new installation. I enclose for your information a brief paper we prepared as it incidentally gives the outlines of the facility. As you will see from the title it was prepared for a non-technical demonstration.

Now that we have a facility which is more compatible than before the possibility of using software developed by other people (and making our own available) is less of a problem (although as you know never a question to be treated lightly). I wondered what news there is about TAXIR. Has the user manual been produced and is the system converted from CDC to IBM and if so for what operating system? I should be very interested to hear your news and to receive copies of any literature.

With all best wishes to yourself and Mrs. Rogers

Yours sincerely,

John Wrigley

J. Wrigley
Chief, Computer Systems
Branch

Professor D.J. Rogers
Professor of Biology
University of Colorado
Boulder, Colorado 80302
USA

VISIT OF THE DIRECTOR-GENERAL AND THE DEPUTY DIRECTOR-GENERAL

TO THE COMPUTER INSTALLATION: OCTOBER 1973

INTRODUCTION

1. In 1972 the Computer Utilisation Policy Committee (CUPC) decided that the computer equipment rented by FAO should be changed. A change was required because the previous suppliers had decided that the particular model of computer rented by FAO would no longer be supported.

Always within the conditions of the same (or less) expenditure on rent, the Organisation (with independant expert advice) examined various alternatives:

- another rented computer from the same supplier;
- different manufacturers computers in the same rent price range;
- the possibility of a rented terminal link to an outside computer and payment for services as required.

2. The final decision of the CUPC, based on technical and economic grounds, was to change the rental contract to an IBM 370/135 machine in the autumn of 1973.

3. Moving computer work - even between machines of the same manufacturer - involves extensive work in conversion of programmes. In the present case the change was a fundamental one because the new rented facility is technically more advanced than the old.

4. From the beginning of 1973 a detailed plan was established to convert all the 200 or so computer programmes used by FAO. In most cases this involved:

- extensive amendment and modification of the programmes;
- testing and "debugging" on a service bureau machine designed to simulate the proposed FAO installation;
- parallel running of applications on the service bureau machine so as to ensure that identical results were given on the simulated new facility to those obtained on the old facility.

5. By May of 1973 a confident forecast could be made that the work of conversion and parallel running would be complete by end-August. It was thus possible to give the final order to install the new facility in September and to remove the old facility after the last day of August.

6. The old facility was dismounted and removed in the first 10 days of September and the new facility assembled and tested by the end of the month. During September FAO therefore had no in-house computer. All essential applications (Payroll, Accounts, Personnel Data, World Food Programme Shipment Information and some scientific calculations) were run on an outside service bureau. Other applications were either brought forward and run in August or postponed until October.

7. From 1 October the new facility was operational in time to commence the October monthly cycle of work. This completed the first phase of the change of equipment; a further phase which involves the connection for in-house terminals is planned for 1974.

THE MEANING OF A COMPUTER FACILITY

8. A computer facility consists of two parts:

- the actual machines which are usually called hardware;

- the pre-written sequences of instructions (programmes) which put the computer to work, usually called software.

9. Software itself can also be classified in two broad categories:

- the manufacturer's "Operating System", a collection of extremely complex compacted programmes directed towards managing the flow of work through the machine itself and providing frequently required common services to other programmes (e.g. loading data ready for analysis, passing results to the printer for output). Any given operating system represents the result of many hundreds of man-years of effort on the part of the staff of the computer manufacturer. With the technical advance of electronic data processing, operating systems have become increasingly more complex. The operating system manages the facility and enables the machine to accept programmes written in one of the internationally standardised programming languages (with the sometimes substantial variations peculiar to a given manufacturer's machine);

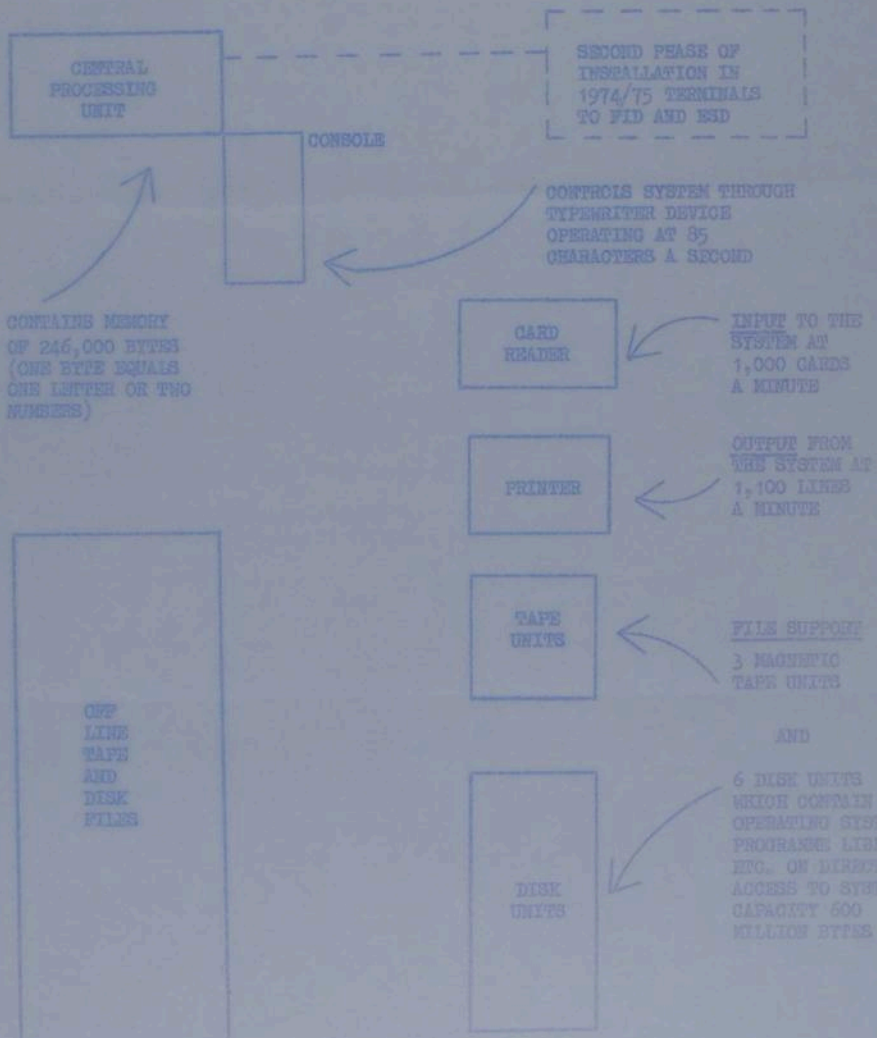
- Application Programmes directed towards processing a specific job. These are either written by FAO staff for particular applications (Payroll, etc.) or packages or routines supplied by the manufacturer either to perform a complete application (Network Analysis) or to form a part of a more complex application (sorting, merging routines). Most FAO programmes are written in two basic internationally standardised programming languages: COBOL and FORTRAN. The first of these is used for the handling of most administrative or other data processing applications: the second for most scientific applications.

THE NEW FACILITY - THE HARDWARE

10. The attached plan shows the layout of the installation in October 1973.

THE FAO COMPUTER INSTALLATION: OCTOBER 1973

IBM 370/135 Operating System Virtual Storage OS/VS1



11. As computers go, the FAO installation can be described as a small/medium facility. The "memory" of the computer (contained in the central processing unit) contains 240,000 bytes. A byte can be considered as a unit which can contain one letter or sign or two numbers. However, these measures of size or capacity mean less with modern operating systems than was the case five or ten years ago.

12. The console of the computer is the point from which the operator gives instructions to the facility and at which the operator receives messages from the machine which the operating system is programmed to supply in given circumstances (when a job is completed, for example, or when a particular adjustment is required). The console is equipped with a typewriter-type mechanism which prints at a speed of about 85 characters a second (that is about one of these typed lines every second).

13. On the FAO installation the only method of introducing new data is by way of the card reader which reads 1,000 cards (of a maximum of 80 letters or numbers) a minute.

14. Once data (in terms of letters or numbers) is in the machine it is "filed" either on magnetic tapes or disks. Both devices operate on broadly similar principles but differ markedly in their physical characteristics. On a magnetic tape the data are held in sequence: that is if one had a file of the National Accounts of all countries the data for country A would be at the beginning of the tape and the data for country Z at the end of the tape. This can be very convenient if the data are to be used in this fixed sequence (for example, to amend or update from another file in the same logical sequence).

However, in many applications the order in which data must be accessed or interrogated bears no relationship to the order in which data are filed. Thus, with a tape file, if the first question was on country A and the next question on country Z the whole of the file would need to be passed over the fixed reading head. With a disk file the whole of the arrays of data are kept constantly in motion on gramophone record-like devices and the reading heads can move over the two surfaces of each disk to different parts of the file under the command of the operating system or the programmes.

15. In addition to holding files of data, the disks also hold the operating system of the computer (and as will be seen below, supplement the function of the computer memory) and hold the FAO "programme library" constantly available and on call to the memory. The disks included in the FAO facility can contain up to 600 million bytes and the facility can be described as disk orientated.

16. All physical output from the FAO facility is by a printer which operates at a speed of 1,100 lines (of 132 characters length) every minute.

17. In the second phase of the change of equipment, terminals to user Departments/Divisions will be connected to the FAO facility. For 1974/75 two terminals have been budgeted by the Fisheries Department and the Economic and Social Affairs Department. These terminals will enable users in Departments/Divisions to use the FAO facility directly. Simultaneously with the installation of the two terminals (with the associated training programme) in 1974, the commercial terminal service in Building F to an outside computer will be discontinued, and the scope of the present Direct-Access User Service expanded.

THE NEW FACILITY - THE SOFTWARE

18. As was mentioned above, software falls into two broad categories - the operating system of the computer and the application programmes. This division is perhaps an artificial one as in fact the programmes operate within the environment created by the operating system (and to a further extent by the facilities offered by the hardware). Thus, the more sophisticated the operating system and the hardware, the greater are the possibilities open to the programmer.

19. The operating system occupies part of the memory of the computer, and it is in the memory that all essential operations are carried out. This is why the computer memory is often called a "brain", although this overstates its possible functions. Nevertheless, one can regard the memory as the centre of the whole complex; a part of the memory is permanently occupied by the operating system which must be installed each day before the computer can start to work and a part is available to take the programmes, interact with them and begin a complex interchange of messages between the memory and programmes, from the memory to the files retained on the hardware and so on.

20. Clearly, if the computer memory is small and a large part is taken up by the operating system, the amount of space left for the programme is small. This is a major constraint on most small computers - the size of the available memory is limited and hence, the capability of the programmes. This constraint can obviously be removed by adding on units of memory - at a cost, of course, since for obvious reasons the memory is an expensive component of any computer facility.

21. With a larger memory (and the same operating system) the space which can be devoted to programmes can be increased. One can thus process one very large programme or the available space can be divided or partitioned (into two or more parts) and several programmes can be handled "simultaneously". In fact, the appearance is simultaneous but actually the operating system works on the different programmes in turn, using the brief pauses when messages are sent from one programme to and from the hardware, to carry out work for other programmes. Obviously, this description is a very broad generalisation of a very complex process which has many variations between different sets of equipment.

22. Because of the limitations of space within computer memories and the possibility of dovetailing together the requirements of several jobs, attention has been given in recent years to the possibility of improving the efficiency with which memories are used. One solution has been to divide large programmes into pieces and bring them into the memory from the files a piece at a time so that no single piece exceeds the space available.

23. The operating system now installed in the FAO facility is so designed that it can split programmes automatically. This is called a virtual memory system. "Virtual" in this case is derived from the concept of the "real image" and the "virtual image" of reflections in a mirror. There is, in fact, a parallel. In the case of the FAO computer, about 130,000 bytes or units are available for programmes in the real memory but nevertheless, with the virtual memory system presently installed, the computer can handle two programmes of 256,000 bytes "simultaneously". Thus the real memory is 130,000 units but in a given set of conditions a virtual memory of 512 units is possible.

24. The operating system creates this capability by automatically controlling each programme on the disk system and dividing up the parts of the programme brought into the memory into blocks or "pages" of 2,000 units. Further, the operating system examines the frequency with which the different pages of the programme are required in the memory and optimises the process by retaining those in the memory which are most frequently required.

25. This capability of using the memory more efficiently opens a number of possibilities for the better use of small/medium computer facilities and provides capabilities which have hitherto only in practical terms been available on large machines. Work can be overlapped: it is not necessary for one job to be completed before another is started. Priorities on work can be arranged: one job can be given the overriding authority to use the hardware but in the inevitable gaps (even though a gap in this context may be measured only in thousandths of a second) other lesser priority work can be allowed to progress. There is thus created a dynamic and optimised queue of work.

26. Terminal connections (to a file or an information storage and retrieval system or to run a small scientific calculation) also become possible - at a cost. It is no longer necessary to reserve a part of the high cost memory for all the hours that the terminal user requires access to the computer. Now when the terminal calls the computer a virtual storage partition can be allocated and given an agreed priority and maintained for the terminal user's purposes until he signs off. At the same time normal work continues on another partition.

A CAUTIONARY CONCLUSION

27. Technical progress is a continuous process; high speeds, more sophistication bring greater possibilities, usually higher total costs and lower unit costs. The human element, however, is still dominant: staff is the major cost in the total bill for computer services and only people can apply the management and common sense required to ensure that facilities are properly used for the purposes for which budgetary approval has been given.

28. For this reason all Computer Services are supplied in FAO on a Programme Budget Basis. In this way the computer specialist and the user are required to seek budgetary approval by a clear statement of what they are to attempt, what it will cost and finally to report the costs incurred period by period up to the limit of the available funds for a particular project.

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99163

DEPARTMENT OF AGRONOMY AND SOILS

June 22, 1973

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

Dear Dave:

I did visit with Leon while in Rome about three weeks ago. He affirmed his interest in you. He indicated that he could not move on any aspect until he received approval from the FAO General Conference, which will take place in November. This was a bit surprising to me in view of Boerma's statement at our meeting. However, it is probable that the posts were wrung out of the D.G. by Frankel, and while it does still seem highly likely it will all come to pass there appear to be usual administrative delays. When the TAC committee meets, and whether they will act to get things going ahead of time and in anticipation of the FAO role, I cannot say. I only want to assure you that as best I know there has been no change in plan or intent.

So, we hope to see you this fall or winter and invite you to Vienna for discussions.

With warmest regards,

Sincerely,

C. F. Konzak
Professor

CFK:dl

CSIRO

WITH THE COMPLIMENTS OF

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

Referred for your information.

(O.H. Frankel)

DIVISION OF PLANT INDUSTRY
P.O. BOX 1600 CANBERRA CITY, A.C.T. 2601

AIR MAIL

OHF:MS
Ref:

17th September, 1973

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

Dear Cal,

You may have heard from Jack Hawkes that I have taken over from him several chapters, including the section on documentation, since his share of editorship has been a good deal larger and more burdensome than mine.

I have now at last come round to going through these chapters and am somewhat troubled by various factors, the first and most superficial, though important enough, being length. The second, obviously, is originality of the information. The third is overlap with other chapters.

Regarding length, I have had to request several authors greatly to reduce the size of their chapters. Regarding originality, it appears that a good deal of your own contribution is contained in similar form in several other papers on the same subject, mostly by yourself. Some matters are also dealt with in greater technical detail in other chapters of this book. The treatment throughout your chapter is expansive, and of the illustrations, Fig. 1 has been seen repeatedly, Fig. 2 does not add anything to Brian Snoad's and in fact seems less complete.

I wonder whether in all these circumstances you could accept a suggestion which to me seems the only possible one. Could you critically go through your draft and select a truly important issue which has not been dealt with by you in earlier papers, or by the three authors of the other chapters? This you could take to some greater depth. After all, this is a chapter in a book, and the time for general statements on the lines of your and Keith's paper in the 1967 book is long past. This contribution should be brief - not more than, say, 2000 words.

If you feel you want to do this, please let me know as soon as possible, and state the topic. I would have to have the manuscript not later than November 1. But please do let me know your decision since it affects the numbering of chapters which follow yours.

Best regards.

Yours sincerely,

(O.H. Frankel)

Dept. of EPO Biology
Univ. of Colorado
Boulder, Colo. 80302
USA
Sept. 11, 1973

Dear Otto:

Thanks for yours of the 4th. As usual, your comments on Cal's paper, and your recommendation are right to the point, and I agree with your suggestion that Cal himself be offered the chance to do his own summarization, including only new or pertinent points.

With respect to the job in Rome, I have had the personal assurance from Albani and Leon that the position, and their desire that I be the first choice are without question. They have said that I would not be left "out in the cold" if I went ahead and asked my university for a leave of absence. I have proceeded on the basis of their personal assurance alone, and have asked for a leave of absence from the university to accept the position.

Let me hastily point out here that the FAO people look upon this position as permanent, and that I should in no way indicate to FAO that I consider the appointment only temporary by asking my university for a leave of absence. It is, therefore, somewhat touchy to let FAO know that I consider their position only a two-year temporary one. I have asked for a leave of absence for two years because, in that length of time, I will either be productive, or will have become so wrapped up in FAO red tape that it is clear that I cannot accomplish the job. The two years then, is a cushion which my university is willing to offer me, and still let me retain my professorial position. I do not want to burn all my bridges here. But let me also assure you that I look upon the job in Rome as of the highest challenge that I have had to date, and that I have a consuming desire to give that work my very best efforts. At the end of the two year period, I will ask for an assessment of my productiveness from you and others who make the real decisions, and on the basis of your recommendations, either continue in the work, or get out and let someone else have a go at it. I do not look upon FAO (or the position) as a place to retire in.

I have told my administrative officers here that there could be no firm offer from FAO until the Council meeting of FAO in November, and these officers have been kind enough not to force a decision from me until that position has been cleared of all possible obstacles. Thus, the university has been very kind to me. Perhaps they have some idea about how slow FAO is in getting things done!

I will appreciate any information you can get while you are in Rome. Perhaps Albani has been wise in not making any written commitments until he has clear instructions to do so. At least, that is the way I interpret things at the moment.

Best regards,

Xxx Sept. 7, 1973

Dear Jorge:

I enclose a copy of my letter of Mar. 23, which gives a very brief listing of my needs, and a very rough estimate of how the funds are to be spent. I realize that this enclosure is not at all specific, but until I have more definite instructions from you, I cannot prepare anything more detailed. I hope that you can provide me with some guidelines for more precise planning and budgetting.

It was good to talk to you, and I look forward to hearing more precisely about the meeting in Turrialba.

Sincerely,

David J. Rogers
Prof. of Biology

Encl.

To:

Dr. Jorge Leon, Chief
Crop Ecology and Genetics Resources Unit
FAO
Rome

Taximetrics Lab.
Dept. EPO Biology
Univ. of Colorado
Boulder, Colo., 80302
USA
August15, 1973

REF.: AGPE-PL 7/47

Dear Jorge:

I now plan to Attend the Turrialba meeting 3-7 December. Please send appropriate documents, air fare, etc.

Still no information on the position there. Since time is very short, I should have applications and other documents. Please give me information at your earliest convenience.

Sincerely,

David J. Rogers
Professor of Biology

Dr. Jorge Leon, Chief
Crop Ecology and Genetic Resources Unit
FAO
Via delle Terme di Caracalla
00100-Rome
Italy.

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Ref. AGPE-PL 7/47

2 AUG. 1973

In reply please mention our subject code ref. and date of this letter

Dear Dave,

When you were last here you mentioned the possibility of sending one of your assistants to the Turrialba meeting from 3-7 December, to discuss documentation problems.

I would like very much to have his name and address as soon as possible in order to give him the details of the meeting.

With best regards,

Jorge León
Chief
Crop Ecology and Genetic Resources Unit
Plant Production and Protection Division

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

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON

DEPARTMENT OF AGRONOMY AND SOILS

July 11, 1973

Dr. T. W. Davies
Ministry of Agriculture, Fisheries and Food
Ruskin Avenue Kew Richmond Surrey
ENGLAND

Dear Dr. Davies:

Your letter of May 22 has been received, and I have asked Mr. Wayne Tate, our computer programmer in WSU's Statistical Services group for help on some points.

First, you must understand that we have no separate funding on which to establish data banks, test systems, etc, and we have only the one programmer in Agriculture who knows enough about TAXIR to help us, and he has many other responsibilities. Consequently, we have not made the progress we would like in use of the TAXIR system. We can tell you some aspects about it, but recommend that you also contact two of the people who developed the original system and who now operate with somewhat different versions. They are: Dr. David Rogers, Department of Environment, Population and Organismic Biology, University of Colorado, Boulder, Colorado 80302 and Mr. R. C. Brill, Computing Center, Michigan State University, Ann Arbor, Michigan 48104.

With reference to your questions:

a) We have the recent Brill version at WSU operating on our IBM 360-67 which has a large capacity, about 1200 K core, though we use only about 240 K. We are operating on OS. Brill's version also is installed at Michigan State University on an IBM 360-65 operating on DOS.

b) We have various types of peripheral equipment usable with TAXIR. These include teletype terminals, an IBM 2941 terminal and a high speed remote reader and printer. Normally we store our data banks on tape but also on disc and we move to disc storage for operation on a batch basis.

c&d) With the USDA Phaseolus Collection, we have over 6000 records with 35 descriptors. This requires about 240 K bytes of core. We are developing several other data banks with different numbers of records and expect to use other features of the system which permit sequential scanning smaller subunits of a data bank.

e) The file format used is not at all standardized. All we have is the data available for study. The structure is based on that.

f) The number of interrogations per month is not now realistic. Use is expected to greatly increase.

g) The types of interrogations are much like those illustrated in the attached reports and output. We have used most of the facilities of the system.

h) It is too early to consider the updating factor, since a full data bank for the one genus Phaseolus for the local USDA Plant Introduction Station has only recently been established. We might expect that a yearly updating would be typical, but there would be on real restriction as to frequency.

i) Most processing runs are relatively short and the frequency of use at this point is not typical of what can be expected once data are available. It all will depend on current usages for the materials, but can be expected. to increase as the existence of a data bank becomes known.

j) Answered above.

k) The major problem I see now is the limitation of the system for handling large numbers of alphabetic names within one data bank. This is surmountable by simply establishing a series of interconnecting data banks which we plan to do. We have about 20,000 wheats in the USDA World Wheat Collection, and there may be as many as 10,000 different cultivar names. We would like a system to store, and retrieve pedigrees and allow us to massage the components of pedigrees. This problem has not been resolved. TAXIR is ideal for item descriptive and especially of numerical data, and repetitive descriptors with a reasonable limited number os states per descriptor. There are manypossible applications we haven't tried. However, our anthropologists use TAXIR to help them sort, rearrange and classify samples, and we expect to use it for handling genetic data. I hope these points help you.

The Brill version of TAXIR is already in Britain at the Plant Breeding Institute at Cambridge. You may wish to visit the group there. Brian Westcott wrote originally for the system.

Sincerely,

C. F Konzak
Professor

CFK:ms
cc: D. Rogers ✓
W. Tate
T. Bogyo
S. Dietz
T. Russell

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Ref.

Rome, 20th June 1973

Dear Professor Rogers,

Thank you for having let me know of the forthcoming publication of your monograph on Manihot. Its appearance will be of considerable assistance to me.

CIAT is establishing a collection of as much of the world literature on cassava as possible, and will thence make available abstracts and fuller information through its Cassava Information Centre. My role has been to prepare a structured vocabulary to make the retrieval of this information as meaningful as possible; the resultant thesaurus will be published by CIAT. The first issue will be a tentative one, and in a subsequent issue I would hope to extend the taxonomic coverage.

With my thanks,

Yours sincerely,

Donald Leatherdale

Donald Leatherdale

Professor David J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80320, USA

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

May 31, 1973.

ans'd & attached

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

Dear Dr. Rogers:

I have recently joined CIMMYT to produce a catalogue and inventory of the maize collections here, and in Colombia, Perú and Argentina. We plan to use the IBM 370-145, the language PL-1, and whatever sorting and inventory procedure we can put together.

We are accumulating background information and would like to have as much pertinent information as we can on TAXIR. If necessary we would pay the cost of copying. Hopefully you can send:

1) a brief description of the program objectives

2) a flow chart of the system

3) program listings

4) details of the storage (permanent and temporary) and of retrieval of data sets, present and future

5) critiques from users.

Can one get rapid inventory updates especially of quantities of seed available?

Can one easily print out inventories based on different criteria? Would the cost of such be comparable to that using special programs in PL-1?

I gather obtaining the system is free.

.../2.

Dr. Gutiérrez passed on to me information from Europe on documentation of germplasm banks. I have a report from Hawkes on the July, 1972 meeting in Birmingham. What you might provide is a summary of the FAO Conference in Rome this spring, or an address for such.

We will appreciate what help you can give us.

Yours sincerely,

Robert McK. Bird

Robert McK. Bird

RMB/geb.

July 23, 1973

Dr. Robert McK. Bird
CIMMYT
Londres 40, Mexico 6, D.F.

Dear Dr. Bird:

Your letter arrived a short time after I had left for six weeks, and I have just now had time to respond. Your letter poses many questions, some of which I can answer, but most, I cannot provide simple replies.

But let me give you some background information before proceeding to your direct quiries. You have already learned that there is now in the planning stage the development of an international network of "documentation" systems for genetic resource centers. No action has been taken on this, because the operations are scheduled to begin after January 1, 1974, provided all agreements are made. FAO has proposed two new positions, one of which is the coordination and development of the network, the other to be a scientist with considerable experience in maintenance of gene banks. Until the FAO governing body meets in November and approves the proposed positions, these positions cannot become active. I have been invited to consider the position on development of the network for documentation, but can take no action until some formal offer is made. I tell you this because your endeavors would no doubt form one of the key features for gene resources under the control of CIMMYT, and I have talked to some extent about cooperation in the network with Dr. Keith Finlay. My contributions to the Technical Conference on Genetic Resource Centers, held last March, in Rome (and the contribution of my colleague, Mr. Gil Hersh) spoke to the necessary types of work that must be done in order to make such a network a reality. Needless to say, summary of our discussions in this letter is impossible, because of the complexities of organization at all levels.

At the moment, I am not funded to continue research and development of the system TAXIR, which originated in my laboratory. The system maintained here is one of the early versions of the system, and while it is powerful as a general information storage and retrieval system, it lacks quite a bit in being a completed system. You have heard from Dr. Konzak (who was kind enough to send me a copy of his July 16 letter to you), in which he speaks of IBM versions now running at Pullman, Washington, and at "Michigan State" (actually at the University of Michigan, Ann Arbor, and not at Michigan State). There are some improvements in the versions running at these two installations over the one maintained here, but these still need considerable work before they should be considered as operable and efficient. None of these have been documented or flow-charted, and would, therefore, be rather difficult to adapt to other computing systems. (Certainly, the program listings are available, but these alone leave much to be desired by a programmer who would have to keep the system running for you). Under the auspices of the Gulf Universities Research Consortium, 1611 Tremont St., Galveston, Texas, TAXIR has been almost

entirely rewritten, cleaned up, and made into a much more efficient system under their own acronym, ENVIR. Since this is a private organization, the system is no longer in the public domain, and has become, like the GIS of IBM, a proprietary system, but open for contract.

It has been our experience that, even with the system TAXIR installed, there are still great needs for instruction in the proper use of the system, and I have noted that at a number of installations, poor use is being made of the system. I have undertaken to correct its misuse, and was (at the time your letter arrived) in Izmir, Turkey at one of the new regional genetic resource units sponsored by FAO, giving the staff a short course on proper application. This institution had already had some exposure to the concepts of TAXIR, but I found them lacking in basic information necessary to get the most benefit from its use. It is with some reluctance, therefore, that I give out the listings, unless the institution also is willing to get proper instruction in its use. I make the analogy that you wouldn't install an electron microscope without having first had considerable training in its use.

There has been an attempt to correct the above situation, in that Mr. Robert Brill has written a "Primer" of TAXIR, which is probably attainable from him at the University of Michigan. Unfortunately, I do not have copies available for distribution. The primer goes to some length in instruction in the system (even giving a list of error messages) but this is not a programmer's manual, and would not serve from that standpoint. But even this rather complete document does not have sufficient detail on how to set up data, what constitutes a data bank, nor full detail on dimensioning the various files to be used in the TAXIR program.

It would be my hope, if the FAO position comes to fruition, to correct some of the above described deficiencies so that all those who, like yourself, would be users of the system can be supplied with complete information, and assistance. Let me point out that the above is not intended to discourage your acquiring and installing TAXIR, but to point out some of the potential difficulties you will encounter in its application. The system as presently running, requires large CPU memory capacity, available only on the larger series IBM 360s (or other computing machines such as CDC or UNIVAC). No doubt, the TAXIR program can be broken into smaller units and run as overlays, but to date, this has not been accomplished. Nor do we know what efficiencies we would sacrifice by such a process. There is no doubt that the data requirements will be large, and that under the best of circumstances, we will still have to operate with large-scale memory. Since most of the genetic resource centers are planned in areas where no big industrial or university-owned computer installations are to be found, we are working towards the network idea, with some sort of tie-line to large scale computer installations. It is our hope to divide the functions of the information systems so that some immediate requirements can be met with small-scale equipment, and to apply the ideas of remote terminals to connect the small-scale equipment to larger-scale hardware. Software for such operations exist, but we have to worry about the proper mix, in terms of cost and effectiveness. If unlimited funds were available (which, obviously they are not) we could think in terms of remote terminals, with transmission via satellite. The effectiveness of such hardware would be very high, but the costs go beyond what I estimate will be available.

There are still other means to accomplish our mutual objectives, but I cannot begin to work on these until I am in a proper position to do so. Obviously, I am not so situated at the moment, and can only hope that the FAO position becomes a reality.

I am sorry to have to reply in these terms, for I know your requirements are immediate. Now that I have made the above disclaimers let me briefly address some of your questions (although you will find some of them discussed above).

Question 1: A brief description of the program objectives.
TAXIR provides most of the basic functions required of any computerized information storage and retrieval system. The input format to the system is free-field, not fixed-field (although that option exists for certain types of data). The system does not require a pre-determined thesaurus or vocabulary, but allows a vocabulary to be established as data describing accessions are accumulated. This provides the flexibility of additional terms as needed, without complex vocabulary updating systems. Addition, correction and deletion functions are part of the system. By means of special programs, data may be converted from any other format to the format of TAXIR (and vice versa, if required). Querying systems in TAXIR provide complete boolian capability, thus providing the user with almost total flexibility in asking and answering questions. The user inputs queries using the vocabulary generated from the initial input data, and formats queries in his own language to generate any combination of output required, from Hierarchically organized complete listings of data for the total data bank, or pinpointing a single object with specified qualities. The ENVIR version (which is probably the most advanced system) has, in addition to precise data retrieval, the capacity to store and retrieve abstracts, or, in other words, can be used in literature retrieval. The basic storage and retrieval method (that is, the computer functions with the data) have been described in a paper by Estabrook and Brill, a copy of which is enclosed.

Question 2, 3, 4: Please see earlier discussions. I am not entirely certain what you want to know in Question 4.

Question 5: Critiques from users. Most actual users of the system have been satisfied, but since many of the users have not been fully instructed in the system, they may have overlooked some of the capabilities which the system provides. Some critiques have been uncritically levelled at the system. For example, one person, who had limited experience with computing machines, and practically no experience in computerized information storage and retrieval systems said that "the system (the programs) takes up an inordinately large amount of memory". I do not consider this a valid criticism when comparisons are made with other systems with the same objectives and capabilities as those of TAXIR. Other criticisms have been leveled at the computer time necessary to structure a data bank. This one needs to be considered in a comparative light, simply because any system with the same objectives and capabilities will require comparatively large amounts of time to accomplish the same tasks. But these times are still only measurable in seconds, not minutes or hours of time. Other criticisms generally come from those who have not bothered to really become instructed in the use of the system, and, like the analogy I

used earlier, (to use of an electron microscope) such criticisms based on ignorance are not valid.

You commented in your letter "I gather obtaining the system if free". While it is true that you may get the listings free, this does not by the same token get you the system, for reasons I have explained above. Instruction in both the computer aspects and in the user aspects are necessary before you have an operable system. In this connection, I recommend you read a paper by Nace, Richard, and Hazen, entitled Information Control in the Amphibian Facility: The Use of R. pipiens, etc. Published in Amer. Zool., 13:115-135. 1973. You can get a reprint from Dr. George W. Nace, Dept. of Zoology, University of Michigan, Ann Arbor, Mich. 48104. Dr. Nace explains the costs (in comparative terms) for installation of TAXIR, with costs of instruction. You can, through Dr. Nace, also contact Mr. Robert Brill.

You ask for a summary of the FAO Conference in Rome. Since this was a week-long conference, this is pretty much of a large order. We are publishing our contributions in a book, one of the editors of which is Dr. J. G. Hawkes, Dept. of Botany, Univ. of Birmingham, Birmingham, England. I don't thing he has himself attempted to summarize the conference, because there is much work to do on the editing alone. Since there were 5 papers in the session on documentation, I have not made an effort to summarize that session either. Just too much work.

I trust this rather lengthy letter serves your purpose. I concur with Dr. Konzak that you definitely should spend some time looking around before deciding on any one approach. I hope to be in a much better position to help out with systems, if and when the FAO activities begins. Thank you for your inquiry.

Sincerely yours,

David J. Rogers
Professor of Biology

Encl.

Copies to: Dr. K. W. Finlay
Dr. C. F. Konzak
Dr. Jorge Leon

DJR/mtg

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON

DEPARTMENT OF AGRONOMY AND SOILS

May 31, 1973

Dr. F. G. H. Lupton
Plant Breeding Institute
Maris Lane, Trumpington
Cambridge CB2 2LQ, ENGLAND

Dear Dr. Lupton:

Your letter of May 15 arrived while I was away to a meeting. Dave Rogers also sent a copy of his reply to you. There are now a fair number of people studying the management of data using or planning to use TAXIR. Many have simply processed data they have in whatever form it was available, anticipating a future standardization.

The coding problems you present are much along lines that have been discussed for several years. It concerns me that anyone still wishes to use zero to refer to no information. If you consider just the job of recording let alone the extra keypunching time required to fill blanks with zeros, that use just doesn't make sense. TAXIR is quite able to tell you no information is available on a given trait. It need not have an entry. The use of zero for no information is also one reason for failure of the former FAO plan developed by Mao. There is a feature in IBM processing that does not distinguish between zeros and blanks unless the programmer makes the distinction. But the programming is not difficult and no scientist should allow himself to be a slave to the machine or a lazy programmer. There are very good uses for the zero code and it should be reserved for that purpose. We seem to have general agreement on its use to mean a zero state, none, absent, etc., but <u>not</u> for no information. The blank or absence of information is quite sufficient.

We are enclosing a photocopy of a draft of descriptors and states we have begun to prepare for cereals especially wheat and also a copy of an abstract and example page describing the coding methods that now have received rather good acceptance. I will be in Europe next year and expect to be working with genetic resource centers to advance their programs and standardization. We hope you will gain some experience with information management so you can take part in the activity.

Sincerely,

Cal

C. F. Konzak
Professor

CFK/am
Enc: 3
CC: D. Rogers

INSTITUT FÜR PFLANZENBAU UND SAATGUTFORSCHUNG
DER FORSCHUNGSANSTALT FÜR LANDWIRTSCHAFT
BRAUNSCHWEIG-VÖLKENRODE
Direktor: Prof. Dr. D. Bommer

33 BRAUNSCHWEIG, Bundesallee 50
Fernruf [redacted] 59 61
Drahtanschrift: Landforschung Braunschweig
Station für Fracht- und Expreßgut:
Bhf. Braunschweig-Lehndorf

May 23, 1973

gene bank

Institut Pflanzenbau FAL 33 Braunschweig Bundesallee 50

Unser Zeichen: Sei/Fl
12-25

Prof. Dr. D. J. Rogers
University of Colorado
Dept. of Biology

Boulder / Colorado 80302

USA

Dear Dave,

This is first of all to thank you very much for sending back my ball point pen.

Recently Dr. Lupton asked for a comment on his wheat descriptor lists. He mentioned in his letter that he was going to ask both you and Prof. Hawkes for corresponding comments. A copy of my answer to him is enclosed.

Last week I attended a symposium on documentation of the International Assiociation of Agricultural Liberarians and Documentalists that was held in Wageningen. It is difficult to draw concrete conclusions from that congress. They are at any rate very interesting people who seem to correspond with each other more easily than we do for genetic resources though our data bank-documentation is considered to be the easiest form of documentation at all with most concrete standardizable substance.

In the meantime a structured thesaurus, based upon those descriptor lists that I had with me in Rome is ready for typewriting with German vize English descriptors. The other version is on the way to be finished soon.

With best regards,
yours sincerely,
by order

(L. Seidewitz)

enclosure

Es wird gebeten, Antworten nur an die Dienststelle und nicht an persönliche Anschriften zu richten.

May 9, 1973

Dr. F. G. H. Lupton
Plant Breeding Institute, Cambridge

Dear Dr. Lupton:

Thank you for your letter of 27 April, including your list of descriptors for wheat and barley. I have examined the list for areas where you may wish to consider different structuring of the descriptors, or descriptor states, and have noted them (or my questions about them) directly on your copy.

May I make a suggestion? While I do know something about the structuring of data so that you may derive the most benefit from them, I am not a specialist on cereals (my specialty is with cassava). If you wish to have some agreement on the desirability of any one descriptor, or group of descriptors for exchange of information on an international scale, I strongly recommend that you contact several other colleagues who are specialists on cereals. You have already consulted Dr. Seidewitz, and I wonder if you would not benefit from consulting Dr. Cal Konzak at Washington State University, Pullman.

I think there is increasing agreement on the use of the 1 - 9 scale for increasing intensities of expression, and that structuring is all right to use in TAXIR. Zero (0) for absence of information is equally acceptable. As far as the system, TAXIR, is concerned, you may use any desirable symbol to express the absence of information. Therefore, as long as you and your cereal colleages are agreed, you have that freedom of choice.

I trust that the above information is satisfactory. I shall be pleased to hear of your progress in the use of TAXIR. If any questions arise, I will be pleased to help where I can.

Sincerely yours,

David J. Rogers
Professor of Biology

cc.: Dr. Cal Konzak.

INSTITUT FÜR PFLANZENBAU UND SAATGUTFORSCHUNG
DER FORSCHUNGSANSTALT FÜR LANDWIRTSCHAFT
BRAUNSCHWEIG-VÖLKENRODE
Direktor: Prof. Dr. D. Bommer

33 BRAUNSCHWEIG, 9. Mai 1973
Bundesallee 50
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Drahtanschrift: Landforschung Braunschweig
Station für Fracht- und Expreßgut:
Bhf. Braunschweig-Lehndorf

Genbank

Institut Pflanzenbau FAL 33 Braunschweig Bundesallee 50

Unser Zeichen: Sei/Fl
12-24/2

Dr. F.G.H. Lupton
Plant Breeding Institute
Maris Lane
Trumpington
Cambridge CB 2 LQ
ENGLAND

Ref.: Your letter FGHL/BH of 27th April, 1973

Dear Dr. Lupton,

With reference to your letter I like to suggest that following changes in your list of descriptors should be made:

EAR DENSITY	3 - lax	1-would mean very lax
	7 - compact	9-would mean very compact
EAR ATTITUDE AT MATURITY	1 - erect	
	9 - strongly recurved	

We have so far used the expression "spike" instead of "ear". "Ear" was used with maize.

SPIKELET NUMBER	3 - low	1-would mean very low
	7 - high	9-would mean very high
SUPERNUMERARY SPIKELET FREQUENCY		
	0 - absent	1-very rare
	7 - frequent	3-rare
		5-intermediate
		7-frequent
		9-very frequent

-2-

GRAINS PER SPIKELET	3 - few	1 - very few
	7 - many (numerous)	5 - intermediate
		9 - very many
THOUSAND GRAIN WEIGHT	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high
SEED SIZE	3 - small	1 - very small
	7 - large	5 - intermediate
		9 - very large

Colors may not be coded so far no international agreement is achieved. I propose to grade color intensity behind the descriptor state of the color itself.

(SHATTERING RESISTANCE)		
SHATTERING TENDENCY	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high
(LODGING RESISTANCE)		
LODGING SUSCEPTIBILITY	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high

The descriptors with "-RESISTANCE" in reality refer to the degree of susceptibility that is measurable.

GLUME COLOR	see above "COLORS"	
GLUME PUBESCENCE	0 - absent	1 - very weak
	+ - present	5 - intermediate
	3 - weak	9 - very strong
	7 - strong	

Two descriptors may never be used as one ("GLUME COLOR and PUBESCENCE").

AWEDNESS	0 - absent
	+ - present
AWN LENGTH	3 - short
	7 - long

SPROUTING TENDENCY	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high
α AMYLASE ACTIVITY	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high
MILLING QUALITY	3 - bad (poor)	1 - very bad (poor)
	7 - good	5 - intermediate
		9 - very good
SEED FIRMNESS	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high

These two descriptors "MILLING QUALITY" and "SEED FIRMNESS" seem to correspond better with the descriptor states mentioned in your list.

BAKING QUALITY (BISCUITS)	3 - bad (poor)	1 - very bad (poor)
BAKING QUALITY (BREAD)	7 - good	5 - intermediate
		9 - very good
QUALITY FOR MACARONI	3 - bad (poor)	1 - very bad (poor)
	7 - good	5 - intermediate
		9 - very good
WATER ABSORPTION	3 - low (poor)	1 - very low (poor)
	7 - high (good)	5 - intermediate
		9 - very high (good)
SEED (GRAIN) PROTEIN CONTENT	3 - low	1 - very low
	7 - high	5 - intermediate
		9 - very high
VERNALISATION REQUIREMENT		
(CHILLING REQUIREMENT)	0 - no requirement	1- very low
	7 - high	3 - low
		5 - intermediate
		9 - very high
(PHOTOPERIOD RESPONSE)		
SHORT DAY RESPONSE	0 - absent (no)	when graded:
	+ - present (yes)	1 - very low
LONG DAY RESPONSE	0 - absent (no)	3 - low
	+ - present (yes)	5 - intermediate
		7 - high
		9 - very high

"SHORT DAY RESPONSE" and "LONG DAY RESPONSE" are considered as two different descriptors and not as descriptor states of "PHOTOPERIOD RESPONSE", however, if there is no short day or long day specification the expression "PHOTO-PERIOD RESPONSE" could be considered as another descriptor states as shown for "SHORT DAY RESPONSE" and "LONG DAY RESPONSE".

(WINTER HARDINESS) We give preference to:
WINTER SUSCEPTIBILITY or OUTWINTERING

1 - very low
3 - low
5 - intermediate
7 - high
9 - very high

COLEOPTILE COLORATION ("DISCOLORATION" would be given preference)

1 - very weak
3 - weak
5 - intermediate
7 - strong
9 - very strong

(TILLERS PER PLANT)
TILLERING

1 - very weak
3 - weak
5 - intermediate
7 - strong
9 - very strong

LEAF SHEATHS PIGMENT (or DISCOLORATION)

0 - absent (no anthocyanin)
7 - strong
9 - very strong
1 - very weak
3 - weak
5 - intermediate

(FLAG LEAF ANGLE)
FLAG LEAF ATTITUDE
in my thesaurus following descriptor states for "FLAG LEAF ATTITUDE" are enlisted:

1 - strongly erect
3 - erect
5 - horizontal
7 - recurved
9 - sloping downward

FLAG LEAF DURATION

1 - very short
3 - short
5 - intermediate
7 - long
9 - very long

FLAG LEAF AREA

1 - very small
3 - small
5 - intermediate
7 - big (large)
9 - very big (very large)

FLAG LEAF DROUGHT (REACTION) (RESPONSE)

1 - very weak
3 - weak
5 - intermediate
7 - strong
9 - very strong

DROUGHT (RESISTANCE) SUSCEPTIBILITY

1 - very low
3 - low
5 - intermediate
7 - high
9 - very high

SPIKE EMERGENCE

1 - very early
3 - early
5 - intermediate
7 - late
9 - very late

TIME EAR (SPIKE) EMERGENCE TO MATURITY (a very long descriptor)

1 - very short
3 - short
5 - intermediate
7 - long
9 - very long

WAXINESS

0 - absent
1 - very weak
3 - weak
5 - intermediate
7 - strong
9 - very strong

CULM LENGTH (STEM HEIGHT)

1 - very short
3 - short
5 - intermediate
7 - long
9 - very long

GIBBERELLIN CONTENT (if "content" is concerned, it should be expressed as low (3) and high (7).

MANGANESE DEFICIENCY SUSCEPTIBILITY (TOLERANCE)

1 - very low
3 - low
5 - intermediate
7 - high
9 - very high

YELLOW RUST SUSCEPTIBILITY (FIELD) and SUSCEPTIBILITY to any other pest or disease should be expressed as low (descriptor state code 3) and high (descriptor state code 7).

Information referring to races of yellow rust etc. should be expressed in relation to normal linguistic use and in accordance with computer rules so far the use of characters is limited. When working with many crops any coding of information on races easily misorientates the receiver of information. Please, take into consideration that gene banks desire an international exchange of information that should be kept easily understandable, without use of decoding equipment. It is not any longer the question of word length that might influence documentation work since computers are advanced as they actually are. Therefore nobody can expect us to do more coding than we find is justificated. However, we try to make descriptors short in order to avoid misprints when retrieving information. Descriptor states as

low - high	weak - strong
bad - good	narrow-broad
fine - coarse	small -big (large)
shallow - deep	lax -dense
early - late	extended -compact (expanded)
etc.	etc.

are understood correctly when a descriptor is accompanied by a code number substituting these descriptorstates.

We would be appreciate any further contacts in order to learn about your decisions after these comments.

With best regards,
yours sincerely,
b. o.
(L. Seidewitz)

I'm not in Braunschweig from May 31st until June 13th. In case your dispose of sufficient time for a short stop-over at Braunschweig on your way to/from Gatersleben we could possibly arrange a meeting either at the Braunschweig railway station or at our institute for discussing international standardization of gene-bank documentation.
Copies of this letter will be sent to Prof. Hawkes and Prof. Rogers. I really hope that our thesaurus can be circulated soon.

PLANT BREEDING INSTITUTE, CAMBRIDGE

MARIS LANE, TRUMPINGTON, CAMBRIDGE CB2 2LQ, ENGLAND

Director: Professor R. Riley, DSc, FRS
Secretary: D. R. Hadden, FCIS

Telephone: Trumpington 2411 (PBX)

Our Reference: FGHL/BH
Your Reference:

27th April, 1973

Dear Dr. Rogers,

I have recently been discussing the possibility of recording our collections of wheat and barley in a Taxir based computer program with Professor Hawkes at Birmingham, and have drawn up a list of Descriptors and Descriptor States for this purpose. In doing this I have used as a basis the list of descriptors which Dr. Seidewitz of Braunschweig has developed, although I have amended his list to include a wider range of agriculturally important characters and have for the time being deleted some of his essentially taxonomic features. I am most anxious to get my program working as soon as possible and my colleague, Brian Westcott, whom I believe you met recently at Birmingham, has now mastered Taxir sufficiently to be able to use it on our Cambridge computer. I enclose a copy of my list of Descriptors and Descriptor States and would be most interested in any comments you care to make as it would clearly be desirable for our descriptors to be compatible with those used by others. One point in particular seems to be important, namely that the score 1 should refer to a low measure of any attribute and 9 to a high measure of that attribute, this leaves 0 for recording the absence of information about that attribute, if this should be required.

File [illegible]

Yours sincerely,

F.G.H. Lupton

Dr. F.G.H. Lupton

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

Descriptors and Descriptor States for Wheat Gene Bank

Genus
Species
Sub species
Cultivar name
Accession number
Country of origin — I suggest 3 Descriptors: (1) Country (2) State or Province (3) specific locality.
  Descriptor states must be listed
Major geographical grouping
  Descriptor states must be listed
Method of breeding
  Old land variety
  Mass selection
  Hybridisation
  Hybridisation with back crossing
  Mutagenesis
  Hybrid wheat
  Interspecific hybridisation
Parentage
Ear Density
  1 lax
  9 compact
Ear attitude at maturity
  1 erect
  9 much curved
Spikelet number
  1 low
  9 high
Supernumerary spikelets
  1 absent
  9 frequent
Grains per spikelet
  1 few
  9 numerous
Thousand grain weight
  1 low
  9 high
Seed size
  1 small
  9 large

1.

Seed color
1 white
3 amber
5 red
7 purple
8 brown

Shattering resistance
1 poor
9 good

Lodging resistance
1 poor
9 good

Wall thickness (peduncle)
1 very thin
9 solid straw

Glume colour and pubescence
1 white smooth
2 white pubescent
3 red smooth
4 red pubescent
5 brown smooth
6 brown pubescent
7 black smooth
8 black pubescent

are these controlled by different genes, 1 for colour, 1 for pubescence? If not known, I strongly recommend 2 descriptors so that later you can separate the one from the other.

Awnedness
1 absent
9 long

Sprouting resistance
1 poor
9 good

α amylase activity
1 low
9 great

Milling quality
1 soft
9 hard

Baking quality
1 good biscuit quality
9 good bread quality

Quality for macaroni
1 poor
9 good

Water absorption
1 poor
9 good
Grain protein content
1 low
9 high
Juvenile habit
1 erect
9 prostrate
Vernalisation requirement
1 no requirement
9 great requirement
Photoperiod response
1 short day response
9 long day response
Winter hardiness
1 poor
9 good
Coleoptile coloration
1 no anthocyanin
9 strong anthocyanin
Tillers per plant
1 poor
9 great
Leaf sheath pigment
1 no anthocyanin
9 strong anthocyanin
Flag leaf angle
1 erect
9 drooping
Flag leaf duration
1 short
9 long
Flag leaf area
1 small
9 large
Flag leaf drought reaction
1 uncurled
9 much curled
Drought resistance
1 poor
9 good

Would these 3 descriptors carry more information if you used as descriptor state the actual count or measurement?

Spike emergence
1 early
9 late
Time for emergence to maturity
1 short
9 long
Waxiness
1 absent
9 abundant
Stem height
1 short — use actual measurements for the descriptor states?
9 long
Gibberellin content
1 low
9 great
Tolerance of Manganese deficiency
1 poor
9 good
Field resistance to yellow rust
For this descriptor, and others relating to resistance to pests and diseases -
1 poor
9 good
Field resistance to: brown rust
stem rust
loose smut
bunt
Alternaria
Powdery mildew
Septoria glumarum
Septoria tritici
Take all
Fusarium root rots
Helminthosporium
Eyespot
Information on physiological specialisation
1 = information on races of yellow rust
2 = brown rust
3 = stem rust
4 = loose smut
5 = bunt
6 = Alternaria
7 = Powdery mildew
8 = Septoria glumarum

9 = information on races of Septoria tritici
10 = Take all
11 = Fusarium root rots
12 = Helminthosporium
13 = Eyespot

Resistance to root cyst nematode
barley yellow dwarf virus
Sitobium avenae
Metapolophium dirhodum
Wheat bulb fly
Hessian fly
Stem saw fly

Information on resistance to other pests and diseases
1 available

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.

19 April 1973

Dear Dave,

Thank you for your letter of 23 March. Do not be surprised if you see this letter posted in London. My son is going to England for a few days and I have given him this letter, as here there is a mail strike that we do not know how long will last.

First, on staff. There will be a secretary assigned full time to the officer in documentation. With reference to other staff, they may be hired as "consultants" on a temporary basis, but I hope we will have extra funds to have permanent assistants. This may come out of the TAC or UNEP funds (UNEP is the new organization: United Nations Environmental Programme).

Second, on travel. This will be done following the requests of the countries, and the priority activities.

Third and fourth. There are some funds, rather limited, in the regular programme of FAO, for computer time. Again, it is considered necessary here to have other supporting funds, and they have been included in the proposal to TAC and UNEP.

Fifth and sixth. I fully agree with your statements. My opinion is that documentation is going to be the key point in the coordination of the network of genetic centres. Quite possibly in the first year the demand in this aspect will be the most pressing job for you.

With reference to the budget, I think I gave you the figures for the next biennium. These are, more or less, $30,000 for consultants, $7,000 for travel, $34,000 for computer time, etc. This is well below the $100,000 per year of your estimation. However, in the proposal to TAC the figure I gave coincides with yours: $100,000 per year.

/.....

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

Finally, the announcement will come out next week. It says "pending the approval of the conference", but as I mentioned to you, it is extremely unlikely that the Conference will not accept the proposal of the Director General. This is especially so in a case like this, where no increase in the total budget is proposed.

Please write to my home address.

Best regards,

Yours sincerely,

Jorge León