

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH  
TECHNICAL ADVISORY COMMITTEE

REPORT OF THE TAC MISSION TO  
THE IBPGR PROGRAMME AT BOULDER, COLORADO (USA)

TAC Secretariat

April 1979

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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8 June 1979

Dear Dr. Cummings,

... I have pleasure in sending herewith the report of the TAC mission on the IBPGR Information Programme at the University of Colorado, Boulder, USA. It has been a personal privilege for me to have been given by TAC the leadership of this mission and to work with such distinguished colleagues as Professors N. Simmonds and J. Warren.

As you know, the preliminary conclusions of the mission were presented to you and to Mr. R. Demuth, Chairman of IBPGR, at the end of our visit to the USA and the Panel benefitted from your and Mr. Demuth's observations.

The draft report was then considered by the Executive Committee of IBPGR at its May 1979 meeting. I was pleased to learn from Dr. T. Williams, Executive Secretary of IBPGR, that the Executive Committee had agreed with the basic thrust of the report. Through Dr. Williams, I received also from the Committee a series of comments and suggestions on the draft report. These have been taken into account as much as possible in finalizing the report while maintaining the integrity of the collective analysis and conclusions made by the Mission Panel.

I wish to thank you again and the members of TAC for the confidence placed in me for the conduct of this mission. I would also like to thank the Panel members for their hard work and the staff of the IBPGR Secretariat and the IS/GR Programme at Boulder for the cooperation extended to us during the mission.

Yours sincerely,

E. Åberg  
Chairman

TAC Mission Panel on  
IBPGR Information Programme

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REPORT OF THE TAC MISSION TO  
THE IBPGR PROGRAMME AT BOULDER, COLORADO (USA)

I. SUMMARY

1. The IBPGR programme, in addressing the information needs of an international genetic resources network, has been confronted with a difficult and demanding task. Considerable effort has been expended and substantial experience has been acquired.
2. Progress has been made in the development of descriptor lists and the storage of germplasm data in an exchangeable format. A computer package for managing germplasm data, EXIR, has been developed and distributed. A technical assistance effort using micro-computers has been initiated. These undertakings appear to have had relatively high costs.
3. Major recommendations of the Panel include:
  - (i) Assignment of the highest priority to the development of directories of centres, personnel, contents of collections and areas of activity for both germplasm related efforts and computing skills related to computing applications in agriculture.
  - (ii) Assignment of equally high priority to the pursuit of minimum descriptor lists.
  - (iii) Adoption of a policy that will avoid investments in the development of computing products or the sponsorship of such products.
  - (iv) Adoption of a policy that will limit the role of IBPGR in computing to that of arranging ad hoc advice upon request. This policy should be implemented in a manner that provides for maximum diversity in the sources of skill employed and should conserve access to the experienced personnel that have recently shifted from IS/GR to a separate USDA programme.
  - (v) Formation of an advisory committee which reports to the Executive Secretary and includes a wide range of computing background, germplasm experience and general experience in computing needs of agricultural research. This committee will advise on persons available for advisory help in computing and assist the Secretariat in reviewing the performance of advisors.
  - (vi) Adoption of revised organizational structure that places responsibility and authority for programme formulation, implementation and budgetary control with the Secretariat.

- (vii) Treatment of technical assistance projects to national governments as special projects or bilateral agreements except in carefully defined and limited conditions.

4. The Panel suggests that immediate attention be given to:

- (i) Providing current EXIR users with the help needed to continue use of that package for a clearly defined period of time.
- (ii) Ensuring that EXIR is no longer to be distributed if other alternatives can be located which are more cost effective.
- (iii) Clarification of the responsibilities that IBPGR will take for the continued maintenance of the micro-computer hardware and software now being distributed in the technical assistance programme.
- (iv) The formation of an advisory committee which will assist the Secretariat in identifying sources of advice (see above (v)).
- (v) The formation of a widely knowledgeable and ad hoc working group to assist the Secretariat in preparing a directory of computing skills and products and to set up a scheme for periodically updating that directory.

## II. INTRODUCTION

5. When reviewing the proposed programme of work and budget of the IBPGR for 1979, TAC at its 19th meeting in June 1978 raised questions as to the purpose and financial support of the contractual arrangement which IBPGR had concluded with the University of Colorado in the field of information on plant genetic resources. The Committee decided to refer these questions to the forthcoming quinquennial review of the IBPGR which was, at that time, scheduled for the first half of 1979. Meanwhile an internal review of the IBPGR programme at Boulder, Colorado, was carried out in October 1978. This review recommended that the orientation of the programme be changed by stopping software development and concentrating on helping several designated centres to put their genetic resources information into machine readable form. These recommendations were endorsed by the Board at its Sixth Meeting in February 1979.

6. The quinquennial review was subsequently postponed to the second half of 1979. The Committee, however, recommended that the questions raised on the information programme of IBPGR should be addressed as soon as possible and this should be done before the Committee had the opportunity to examine the IBPGR proposals for its programme of work and budget for 1980. The Secretariat of TAC was therefore requested to mount a mission of three consultants to visit the IBPGR information programme at Boulder, Colorado and report to the TAC at the 22nd meeting.

7. The terms of reference of the mission were established as follows.

(i) To gain an understanding of the past and present objectives, strategies, priorities and programmes of the IBPGR in meeting the needs for improved information, documentation and communication on plant genetic resources at international level. In this context, to analyze the scope, organization and management of past and present activities supported by the Board at the University of Colorado, Boulder.

(ii) To assess the usefulness of the results obtained through the IBPGR-supported activities at Boulder in the light of the needs, in particular:

(a) to identify achievements and constraints relating to the adoption and use of EXIR by different categories of users in developed and developing countries; and

(b) to review the technical help provided to other institutions.

(iii) To advise TAC on the rationale for a continued CGIAR support to the Boulder programme, on its future direction, management and guidance, on the nature and level of support required for its component activities and on possible alternatives to the present arrangements.

8. In addition to the above terms of reference, the Team was assisted in its work by a list of questions which had been identified by reference to the documentation made available (Annex II). The list of questions (Annex I) was largely based upon a review of TAC and CGIAR discussions as recorded in the reports of their meetings and on an analysis by the TAC Secretariat of the documentation provided. As indicated in the list presented in Annex II, this documentation was considerable. It concerned mostly, however, the past and present activities of the Board in the field of genetic resources information and provided limited information on the future plans of work beyond 1979 in this field. In fact, a report on the proposed 1980 programme of work and budget was only being prepared when the mission visited Boulder.

9. At the request of the Panel, the Chairman of the Advisory Committee<sup>1/</sup> provided a note giving his personal views on future prospects regarding this programme. Like the overall document on the future plans of the Board, however, this note essentially outlined the future perspective of the activities and their organisation and, understandably, could not provide sufficient information to the Panel on the future work plans and resource allocations proposed for the programme in 1980 and beyond.

10. The Mission Panel was composed of Prof. E. Åberg (plant taxonomist and agronomist) Swedish University of Agricultural Sciences, Uppsala, Sweden (Chairman), with Prof. N.W. Simmonds (plant geneticist), University of Edinburgh, UK and Prof. J.A. Warren (agricultural applications of statistics and computing specialist), University of New Hampshire, USA, as Panel members. Mr P.J. Mahler, Executive Secretary of TAC, acted as secretary of the Panel. Mr J. Griffith, Senior Programme Officer, World Bank, participated as an observer on behalf of the CGIAR Secretariat.

11. The mission was carried out from 4 to 9 April. The Panel first assembled in Washington on 4 April and met with Mr. F. Williams, Assistant Director, Research, U.S. Department of State, Dr. Q. Jones, Coordinator for Plant Germplasm, Science and Education Administration/Agricultural Research, USDA, Mr. D.M. Daugherty, Assistant Chief, International Programs Staff, Science and Education Administration, USDA, and members of the CGIAR and TAC Secretariats. The Panel also met with Dr. G.N. Hersh, Director of the Laboratory for Information Science in Agriculture (LISA), Fort Collins, who was formerly associated with the information programme at Boulder. The Team then visited the Information Science/Genetic Resources Programme (IS/GR) at Boulder, Colorado, for two days where it had extensive discussions with the Director of the IS/GR programme (Prof. C. McMillan), the Chairman of the IBPGR Advisory Committee for the programme (Prof. A.H. Bunting) and with the Executive Secretary of the Board (Dr. J.T. Williams). The team also met briefly with two former chief scientists of the programme, Drs. K. Rawal and J. Hanley, now staff members of LISA. The Team returned to Washington on 7 April, drafted its report and on the 9th presented its conclusions first to the Chairman of TAC, Dr. R.W. Cummings, and then to the Chairman of IBPGR, Mr. R. Demuth.

12. The Panel was helpfully received both at the FAO Offices in Washington and by the Group at Boulder. It wishes to record its thanks to both for the good working arrangements made and for helpful responses to requests for information.

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<sup>1/</sup> IBPGR Advisory Committee on the Genetic Resources Communication Information and Documentation System.

### III: GENERAL CONSIDERATIONS AND THE ROLE OF IBPGR IN GENETIC RESOURCES INFORMATION

#### 1. General Considerations

13. The need for genetic conservation has now been thoroughly accepted for about 10 years. It emerged from the realization, largely stimulated by FAO, that genetic resources were precious, that they were declining rapidly, that they were essentially non-renewable and that they were of profound long-term practical value. The practical conclusion was that, since the decline could clearly not be halted in situ, there was an evident necessity to conserve large collections of crop plants in perpetuity. The need is not long-term; it is immediate and infinite and it applies to all crops; none can be considered exempt. So much is now generally accepted.

14. The ultimate object is practical: to conserve variability in usable form for the benefit of plant breeding and therefore (the Panel reasonably assumes) for the ultimate benefit of mankind. This, too, is generally accepted. The procedures appropriate to the acquisition, maintenance, distribution and utilization of plant collections stem from the biological natures of individual crops; they are, as might be expected, exceedingly diverse; wheat, coconuts, bananas and potatoes pose quite different practical problems which require diverse solutions. The information component of genetic resource work is, however, virtually independent of crop biology and the technology of maintenance. Thus the problems of, for example, definition of descriptors, are often considerable but they are of the same general nature whatever the crop and it matters little whether one is considering wheat or bananas. The Panel therefore ignored biological complication and addressed itself solely to the information aspect.

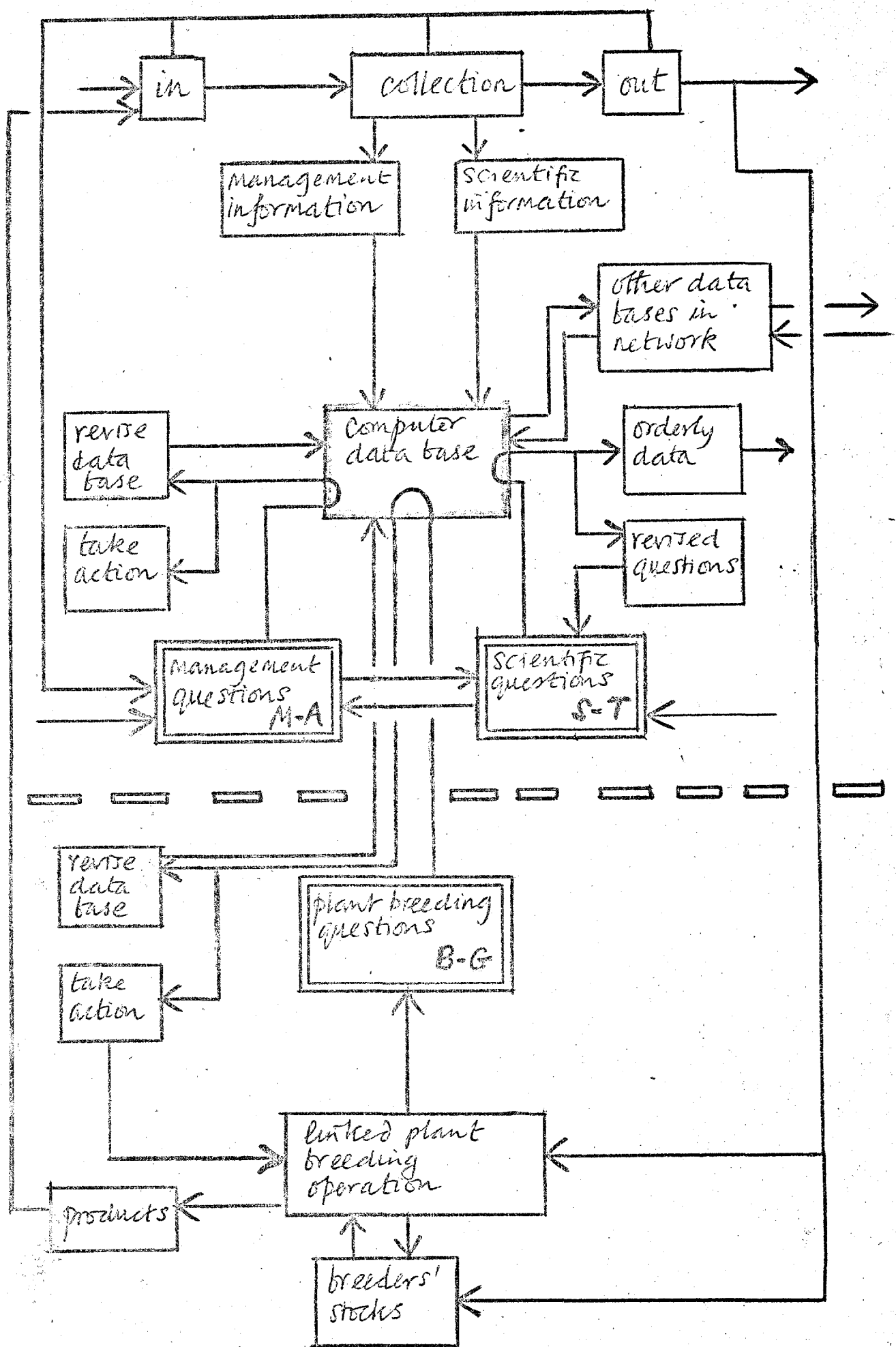
15. That there is a basic need for some information about all the entries in a collection is not in doubt. The questions of what information and how much are explored below. The Panel wishes simply to note that the common idea that information management and computerization are virtually synonymous is wrong. The information about a small collection can well be handled by the purely mechanical methods traditional in the past. Large bodies of data, however, and large collections, are far better handled by computer. Declining costs of equipment will no doubt ensure that computers, already well established in the field, become ever more widely used for this purpose. This report is therefore basically concerned with computer-based methods; but one does well to recall that they are not yet universally adopted.

#### 2. Kinds and Uses of Information

16. In the diagram (Fig. 1) are distinguished three kinds of information: management-administrative (M-A), scientific-taxonomic (S-T), and breeding-genetic (B-G). The first (M-A) will contain the primary data (accession number, collector, date, site, altitude, soil, etc.) and secondary,



Fig. 1 - THE THREE POSSIBLE REQUIREMENTS OF A DATA BASE



EXPLANATORY NOTE ON THE DIAGRAM PRESENTED IN FIGURE 1

The information base in genetic resource work. Three kinds of data/questions are apparent (see text): M-A (management - administrative), S-T (scientific - taxonomic), B-G (breeding - genetic). Note interactions between M-A and S-T. As argued in the text, the B-G component (below the dashed line) could be incorporated in the same data base but is, in practice, separable; from the viewpoint of collection management, M-A and S-T alone are essential (and linked).

maintenance data (viability, stocks in hand, regeneration, etc). The second (S-T) will contain descriptive material contributed by the collector and taxonomic data assembled subsequent to entry into the collection. The characters recorded will be often of the yes-no, present-absent kind and will be characterized by few states, high heritability and low interaction with environmental factors; that is, they will have relatively stable expression. The third category (B-G) will only emerge from extensive evaluation studies by breeders. The characters recorded are occasionally of the simple, discrete kind (e.g. major-gene disease resistance) but are, much more often, examples of continuous, polygenic variation showing low heritability and large environmental interactions (e.g. yield, quality features, field resistance to disease).

17. The relative importance and manageability of the three kinds of data deserve comment. The first two kinds (M-A and S-T) are, in principle, relatively easily adapted to the computer. In practice, agreement as to definition of descriptors and states is not always easily attained and some variable materials (outbred or mixed populations) present problems but partial or imperfect solutions are always feasible. The basic requirement is the agreed list of descriptors (to which IBPGR has long, and certainly correctly, attached so much importance). Given appropriate machinery and software, allied to competent physical management of the collection, basic data can easily be transmitted between collections, individual lines can be at least fairly closely identified, the management of stocks can be facilitated and information can be made available to researchers. Apart from outright errors (which do happen, however), information is unambiguous, stable, easily stored and easily transmitted. It is otherwise with the third category (B-G): continuous, widely-varying characters are harder and more costly to handle by computer; the data themselves are mostly applicable to one time and one place - while they may be of some (limited) value to workers elsewhere.

18. The Panel thinks that a rather important point flows from the distinction just made. Information categories M-A and S-T are inherent in the collection itself and are jointly sufficient for its efficient operation. Any collection that provided good data of these kinds would be doing what was basically required of it. The category B-G is, in a sense, adventitious. The demand for it arises from the facts that: (a) the ultimate object of any collection is to facilitate plant breeding and (b) major collections ('base collections' in the commonly adopted nomenclature) are often, as matters of convenience and practical common sense, closely associated with active breeding programmes. The evaluations which are the substance of B-G type data are produced by plant breeders for plant breeding purposes and for this they are essential. However, they are not essential to the efficient management of a collection and, as was noted above, pose operational and biological problems the solution of which might actually impede the work of the collection per se. In short, plant breeders will surely need to develop their own data bases for

their own purposes; to associate them with collection data-bases is unnecessary and could actually be inimical to genetic resource work by generating avoidable complexity and diverting limiting resources. The simpler an information system, the more robust and the cheaper it is and the further the funds go; the basic needs of even a large collection are not too complex and should not, the Panel thinks, be confounded with the distinct (though clearly not unrelated) needs of plant breeding.

### 3. The Roles of IBPGR

19. Before IBPGR was established, there was no systematic collecting on a world-wide basis of all crops; the need had not been generally perceived. There were a few great national collections (the USSR, the USA) and a scatter of individual crop collections, nearly always associated with breeding programmes. There was much genetic erosion because the collections were often not very highly regarded and indeed several important ones were totally lost. The IBPGR has sought, following the basic FAO initiative (middle 1960s) to promote the conservation of genetic resources of major crops on an all-time, world-wide basis. To do this, it has generated priority lists by crops and regions, has encouraged appropriate local initiatives to collect and assemble and has promoted understanding and development of ideas on data/information management and flow.

20. The mandate of the IBPGR (See Annex III) is wide. Very briefly paraphrased, it is to promote, on an international scale, the conservation, diffusion and utilization of any and all plant materials which are of major economic importance, either globally or regionally. The information component of its remit is covered in paragraphs 9 and 10 of its terms of reference, as follows:

"9. To promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections;

10. To make appropriate recommendations with respect to computerized information, storage and retrieval system, taking into account their suitability for an effective international genetic resources network, and their compatibility with existing systems already in operation at some regional and national centres."

21. The IBPGR (surely correctly) recognized that there were two fundamental requirements of any information system that should effectively serve the world-wide needs of plant breeding in any one crop: (1) an orderly, agreed system of annotation and description; and (2) efficient methods of storage, retrieval and transmission of intelligible data. To promote (1) it has generated a series of committees/working groups on specific crops charged i.a. to produce descriptor lists (both minimal and amplified). This task is not difficult; it has been well begun but many crops are yet untouched and the

Board plans greater pressure in this important area. The information categories covered are, of course, M-A and S-T in our nomenclature (See para.17 above). The storage-retrieval aspect (2) is the principal subject matter of this report and is covered elsewhere. The Panel notes here that any data system is only as good as the inputs and recalls the sometimes overlooked garbage-in-garbage-out principle. An excellent data system cannot compensate for ill-chosen descriptors or poor physical management of the collection.

22. To place the information aspect of the Board's work in some sort of a time-perspective, the Panel recalls that the Board itself has remarked that it will not have an indefinite existence. Its job will have been done when a substantial fraction of the variability in each of a substantial fraction of the major world's crops is safely conserved in well-managed collections. This will not be soon. The basic information requirements will be met (in the form of accepted descriptor lists and appropriate computer systems) long before this point is reached. The Panel recalls here its opinion (para 18 ) that plant breeding data (B-G) need not and, indeed, in the early phases at least, should not, enter the information system.

#### 4. Institutional Arrangements

23. Three kinds of institutional arrangements for the conservation of collections are apparent: the national, the regional and the crop-specific. National collections (for example the Russian and American ones) typically cover many kinds of crops, as also do regional ones (for example the European Gene Banks). Crop-specific collections are characteristically devoted to crops for which there is local breeding responsibility (for example rice at IRRI, sorghum at ICRISAT). It is unlikely (having regard to ecological amplitude and diseases) that any major crop could be kept effectively at one place so, in practice, collections are widely dispersed as sub-collections, the totality representing the crop as a whole. Duplication between collections is desirable as an insurance against various local hazards. The notion of the single, gigantic, all-inclusive collection in one place is neither realistic nor biologically sensible. From the information point of view, the total data bank for a crop must also be dispersed and therefore provided with an appropriate referral system to aid searchers. So much is generally accepted and the IBPGR has worked within the general framework of dispersed sub-collections joined by freely-flowing materials and data.

24. From the information point of view, the relevance of the IBPGR's information objectives (para 20) to the practical situation will be apparent: agreed descriptors and efficient communications are essential if the system is to work. In the longer run, one expects to see a strong flow of materials and information between widely spread workers, a productive network stimulated, in part, by the catalytic activity of the Board. Workers in some crops (for example sugar cane, barley) are already in remarkably close touch with each other internationally; this must tend to facilitate, to provide a basis for, the adoption of standard descriptors and methods. Contrariwise, the Board's promotion of those last must have beneficial effects beyond the immediate objectives. These invisible colleges are, crop-by-crop, a potent stimulus to information flow.

#### IV. ORGANIZATION AND MANAGEMENT OF IBPGR ACTIVITIES IN THE FIELD OF GENETIC RESOURCES INFORMATION

##### 1. The Programme

25. The major part of the programme of IBPGR in the field of genetic resources information was and still is implemented by means of contracts with the University of Colorado, at Boulder.

26. During the first years and until 1976, the executing agency for these contracts was the Taximetrics Laboratory of the University of Colorado at Boulder. This laboratory had launched a programme for the development of a Genetic Resources Communication, Information and Documentation System (GR/CIDS), which was funded from a number of sources including IBPGR, FAO, the University of Colorado, and USDA. Within this programme, the work of the Taximetrics Laboratory in support of IBPGR was determined through joint discussions and negotiations between the Laboratory and the Board, leading to yearly contracts with specifications of the work plan, operations, and budgets.

27. In 1976-77, the GR/CIDS programme of the University of Colorado was transferred from the Taximetrics Laboratory to the College of Business Administration and was officially placed under the Division of Information Sciences Research. The procedures of cooperation with IBPGR however remained basically the same. The programme, renamed Information Sciences/Genetic Resources (IS/GR), included both activities funded by IBPGR and others, either international or national in scope, public or private, financed from various sources including FAO, the IARCs, USDA, IBM, other US corporations, and the University of Colorado.

28. Late in 1978, a further change occurred with the departure of a large part of the staff of IS/GR to the College of Agricultural Sciences at Fort Collins, Colorado, to establish a new Laboratory for Information Science in Agriculture (LISA). An IBPGR mission <sup>1/</sup> was sent to Boulder at that time for an internal review of the programme. The recommendations of the internal review (i.e. to stop software development and concentrate on technical assistance) were subsequently endorsed by the Board in February 1979. The IS/GR programme then became almost exclusively confined to activities supported by IBPGR funds along with computer time provided by the University.

##### 2. The Advisory Committee

29. After the inception of this programme, the IBPGR realized that the expertise available in its membership and in its secretariat was not sufficient to provide for the guidance and control of the highly specialized activities carried out at

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<sup>1/</sup> Participants in the mission were Mr. R. Demuth, Prof. A.H. Bunting and Dr. T. Williams. Reference to the report is made in Annex II, page 2.

Boulder on its behalf. At its third meeting (in February 1976) the Board formally established an Advisory Committee on the Genetic Resources Communication Information and Documentation System, with the following terms of reference 1/:

"The Advisory Committee will be responsible to the International Board for Plant Genetic Resources (IBPGR) and will report periodically to the IBPGR, recommending whatever actions the Committee believes to be necessary or desirable in connection with Communication, Information and Documentation System (GR/CIDS) for the assembly, storage and retrieval of information on plant genetic resources which is being developed by the Taximetrics Laboratory of the University of Colorado at Boulder, Colorado, USA. Specifically, the Committee will:

(1) Evaluate the technical quality of the System for the purposes of classification of and exchange of information on crop germplasm resources.

(2) Evaluate the specific priorities and targets of the GR/CIDS programme in the light of the goals and objectives of the IBPGR.

(3) Evaluate the plans and resources of the Taximetrics Laboratory as against the objectives of the GR/CIDS project, and advise on the time period and manpower and financial resources likely to be required to achieve those objectives.

(4) Consider the present and future computer software and hardware requirements of the System and advise on (a) whether these appear reasonable in relation to the objectives of the IBPGR programme and the staff and computing facilities likely to be available to prospective users of the System, and (b) whether there are practicable means by which the operational requirements of the System might be simplified.

(5) Advise on the long-term aspects of genetic resources data management, including whether there is need for a central point in the international network to monitor and assist in both computer-related work and use of the gathered data, and if there is believed to be such a need on how it can most effectively be met.

(6) Advise on any other matters with regard to the System or the GR/CIDS programme (a) which the Advisory Committee believes to be important with respect to the effectiveness of the System, and to the duration and amount of financial support by the IBPGR for the GR/CIDS programme, or (b) on which the advice of the Committee is specifically requested by either the Director of the Taximetrics Laboratory of the University of Colorado, the IBPGR or the Technical Advisory Committee of the Consultative Group on International Agricultural Research.

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<sup>1</sup>The Panel was informed that the Committee as now constituted will be dissolved and established on a different basis both in terms of membership and disciplines covered and in terms of scope, its responsibilities being possibly expanded and covering other aspects of the future information programme of IBPGR.

Appointment of the Committee will be for an initial period of three years. During this period, the Committee will meet at least once a year, and more often if it believes that additional meetings are necessary. Unless the Committee otherwise decides, meetings will be held at the Taximetrics Laboratory of the University of Colorado, Boulder, Colorado, and copies of all Committee reports to the IBPGR will be made available to the Director of that Laboratory."

30. The members appointed by the Board to the Advisory Committee were:

Dr L.M. Branscomb, Vice-President and Chief Scientist, IBM Corporation, Armonk, New York, USA

Dr A.H. Bunting, Professor of Agricultural Development Overseas, University of Reading, England, UK (a member of IBPGR and of its Executive Committee) (Chairman)

Dr K.W. Finlay, Deputy Director General, Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT), Mexico

Mr J.L. Fyfe, formerly Deputy Director, Scottish Plant Breeding Station, Pentlandsfield, Roslin, Midlothian, Scotland, UK

Dr W. Salhuana, Director, Centro Estadístico Procesamiento de Datos, Universidad Nacional Agraria, La Molina, Lima, Peru.

31. The meetings of the Committee were also attended by the Director of the programme and as observers, the Chairman of the IBPGR and representatives of the Secretariat and other interested parties as required (e.g. USDA).

32. The Committee met every year. Its main task was to consider the progress reports and draft work plans and budget proposals for the programme and to transmit these documents to the Board with its observations and recommendations. In practice, the Committee, through its Chairman who visited the programme several times a year, played a growing role not only in the formulation of the programme and in its overall direction but in the coordination both with other activities of the Board and with other activities of the programme which were not funded by the Board.

### 3. The Crop Advisory Committees

33. The work of the information programme on specific crops had to be guided by specialists in the related field of conservation and utilization of genetic resources of these crops. This guidance was provided by the Crop Advisory Committees of the Board for five major crops and by specialized working groups. These committees which advised the Board mainly on the priorities for genetic resources collections and exploration, were also requested to assist in the development of the related information programmes, in particular the definition of common sets of descriptors for the standardization of the genetic resources information on particular crops. For this purpose, staff of the Boulder programme were associated with the work of the Crop Advisory Committees.



4. Observations on the Management of the Programme

34. Until recently the work of Boulder programme for IBPGR was part of a broader range of activities carried out under the auspices of the University of Colorado. The coordination of activities was ensured by joint meetings of the Advisory Committee of the Board for the CIDS (now IS/GR) programme with yet another advisory committee, this one appointed by Colorado University in 1977.

35. Until the end of 1978, the role of the IBPGR Secretariat in connection with this programme was to assist in the preparation and signature of the contracts and in the disbursement of funds on behalf of the Board. The Secretariat also played an active role in working out the practical arrangements needed for participation of the Boulder programme in other activities of the Board.

36. The major decisions which were taken as a result of the successive changes in the organization of these activities by the University of Colorado were based on the findings of several missions of the Chairmen of the Board and of the Advisory Committee.

37. More recently, a post of information programme officer was established in the Secretariat with the intention of strengthening the capabilities of the Board in this area. The specific tasks assigned to this post are listed in Annex IV.

38. As regards the resources made available by IBPGR to the programme, these consisted of funds for salaries, travel, computer services and equipment. Until the transfer of some of the IS/GR activities to LISA, Fort Collins, the staff and the programme activities were in part paid by IBPGR and partly from other sources. Table 1 gives the staffing patterns in 1977 and 1979. Table 2 illustrates the relative importance of different sources of funding to the programme.

39. Having reviewed the organization and management of the programme, the Panel wishes to make the following observations:

(i) Since its inception and until the late summer of 1978, the IBPGR-funded activities at Boulder were part of a broader programme with multiple objectives and sources of funding (international, national, public and private). Although this situation was in line with the catalytic role which the IBPGR wishes to play, it proved difficult for the Board to control the use of its resources. The Advisory Committee, through its Chairman, subsequently assumed growing responsibilities which went beyond its advisory role to the Board in formulating, guiding and reporting on the programme.

(ii) The Advisory Committee recommended to the IBPGR adoption of funding procedures for Boulder in which the IBPGR Secretariat is in a position of 'provider of funds' under an agreement that calls for funding at regular intervals. This process of funding is largely independent from that of monitoring the results of the programme. There is no control over the disposition of these funds by the Secretariat.

(iii) The accounting procedures at Boulder, after many promises for improvement, have undergone little change over the past two years. Under this present system, it is difficult to state that all the funds provided by the IBPGR are being spent in the manner intended.

(iv) Programme formulation and review lack forward planning. The team received differing viewpoints as to the future Boulder programme and it is clear that the programme for 1979 and 1980 is highly fluid at this time. The Boulder budget has been significantly reduced in scope (from some \$500,000 to \$300,000). The rationale for continued funding of the programme had not yet clearly emerged.

(v) The Panel was given to understand by the Director of the Programme that the Board gave permission for IS/GR to expand its mandate beyond germplasm data management requirements. It was to look at such other items as trials analysis, farming systems modelling, operations research, and administrative data processing needs of centres; this seems a very wide mandate indeed, especially at a time when its budget has been cut by 40%.

(vi) The Panel believes that this situation could be greatly improved by removing the functions of programme formulation, budgetary review and control from the Advisory Committee and placing them into the hands of the IBPGR Secretariat.

(vii) The newly proposed Advisory Committee would have a wider mandate than previously accepted: this new body is to advise all IBPGR activities related to management of germ plasm information. In the opinion of the Panel, any newly constituted advisory committee in this area should be very carefully constructed to draw upon a wide diversity of backgrounds and should report to the Secretariat. It should not include representatives of computer vendors nor should it be used as source of consultants for advisory services provided through the Secretariat.

## V. PROGRESS REVIEW OF THE IBPGR PROGRAMME AT BOULDER

### 1. Major Undertakings

#### 40. Major undertakings of the Boulder group include:

- (i) Data Banks and Descriptor Lists - The Boulder Group has been involved in the assembly of a number of data banks and the assembly of descriptor tests.
- (ii) EXIR - A collection of programmes (software packages) for storing and managing genetic data. A seed storage management programme will be considered part of this collection.
- (iii) A Micro-Computer Based System - A low cost computer system that includes programmes for storing germplasm data and performing some searches and statistical analyses.
- (iv) Training and Promotion - Conduct of courses, provision of technical assistance, visits with potential collaborators, etc.

### 2. Comments on Assessing Costs and Benefits

41. Over the period from 1975 until 1978 around \$1.5 million was invested in the IBPGR programme at Boulder. It is difficult to form even an approximate picture of what has been accomplished. When this question was raised with principals involved in the project, answers cited two classes of benefits:

Tangible products such as the EXIR programme, data put into retrievable form, etc.; and

Intangibles such as stimulation of efforts for managing information, knowledge of the problems of information management, personal contacts with persons interested in germplasm, etc.

42. When costs and benefits for the Boulder programme are considered, it is relevant to observe:

- Many intangible benefits tend to be associated with people.
- Experience resides in people, personal contacts, etc.
- At least 3/4 of the professionals formerly associated with the Boulder project have become separated from that project since October 1978 (See Table 1).
- No provision has been made for IBPGR to benefit from the experience of those who have left.

Table 1.

Composition of the IS/GR Staff

1977

Claude McMillan, Director  
Jay E. April, Director  
Gilbert N. Hersh, Director  
Kanti Rawal, Chief Scientist  
Jim Hanley, Chief Computer Scientist

Systems Investigation and Development

Don Watt, Head  
John Gertsch  
Jerry Kaltenhauser, C.U. Computing Center  
Jeff Scott  
Allan Shafton  
Margaret Snyder  
Steve Snyder, located at CIMMYT  
Zhahai Stewart  
Jim Warner, C.U. Computing Center  
Joe Wingerd

Data Services

Lou Vincent, Head  
William Boyd  
John Thompson  
Gail Von Borstell

Education and Training

Greg McArthur, Head  
June Arnold  
Rafael Zarate

Support Services

Arden Switzer, Head  
Sandy Beach  
Karen Nein, Publications  
Marcia Rinck

(Table 1. - cont'd)

1979

Claude McMillan, Director

Lou Vincent, Director of Operations

Arden Switzer, Coordinator of Personnel, Budgets & Accounting and Purchasing

Allan Shafton, Systems Analyst

Greg McArthur, Biologist, Analyst and Education & Training Manager

Zhahai Stewart, Programmer

Wilfredo Salhuana, Chief Scientist

Richard Crosby, Graduate Student

Edward Lyell, Consultant

Gail von Borstell, Data Coordinator

Wira Babiak, Data Coordinator

43. The general impression given to this Panel has been that the bulk of the benefits to be credited to the Boulder programme are made up of intangibles. Unless measures are taken to continue access to the personnel located at Ft. Collins, little benefit can be credited to the Boulder programme for intangibles.

44. This risk of losing intangible benefits is particularly troublesome because tangible benefits are limited and a total cost of \$1.5 million has to be assigned somewhere. If intangible benefits have been great, then much of the benefit of the programme is currently in danger of being lost. If intangible benefits were not great, then the cost:tangible benefit ratio appears to be poor.

45. The Panel would have preferred to have worked with actual costs for the tangible products resulting from this project. The Panel has not been able to identify such costs in the material that has been available to it. It recommends that such costs be obtained. In the material that follows the Panel's comments on costs are based on analyses that have produced consistent conclusions over a variety of assumptions.

### 3. Assessment of Tangible Products

#### 3.1. Data Banks and Descriptor Lists

46. Annex V lists 18 EXIR users and 2 descriptor lists that have been developed in association with the Boulder programme. In the absence of cost information, the Panel declines to comment on whether or not this should be regarded as a reasonable return on investment. When cost information is available, allowance should be made for the tendency for start-up efforts to incur higher costs than activities that have become routine.

#### 3.2. EXIR

47. The principals concerned with both the Boulder project and the USDA's Ft. Collins project agree that EXIR now has no special advantages. However, when this project started there was a need for software development. The project did provide some features that otherwise were not easy to obtain at that time. Problems associated with the adoption and use of EXIR have been abundantly identified by members of the Boulder team. They range from technical constraints related to memory size required, compiler language, etc. to design features such as provision for arithmetic operations, file merger, etc. EXIR is a programme that has some good features that can be made available on a limited range of computers. In most, if not all cases, where a computer can support EXIR it can also support other packages that provide the same or more functions than EXIR. Adoption of EXIR by new sites should be further limited by the current policy of the Boulder group that it will not maintain EXIR.

48. In 1976, the Boulder Group listed 18 installations as EXIR users. They now list 17 installations as active users. Six of the "currently active" users were also listed in 1976.

49. Consideration of EXIR should take into account two types of cost that must be of concern to IBPGR:

(i) Maintenance. If IBPGR wishes to be regarded as a credible source of help for scientists wishing to manage germplasm collections, it should not abandon those users who trusted the Boulder group and installed EXIR. If maintenance of EXIR is to be discontinued, it should be preceded by at least one year's notice and with vigorous efforts to locate and install an equivalent retrieval package.

In addressing the problem of maintaining EXIR it should be kept in mind that the personnel who developed EXIR are in the Ft. Collins group. This source of maintenance should be used if possible. It is estimated that at least one skilled programmer (salary level around \$18,000 per year) will be needed to maintain EXIR.

(ii) New User Cost. Even though the principals connected with the Boulder programme state that EXIR is now not promoted and even though it was announced by the Advisory Board in 1977 that EXIR would only be supplied to organizations having skilled programmers, that group still seems to be actively promoting adoption of EXIR (Work Plan 1979) and sometimes commits to supplying EXIR without checking on programming capability. There are now 7 requests pending for EXIR. Filling those requests will add to IBPGR's obligations for maintenance. They may even carry extra costs. In some cases there may be alternatives that are as good or better than EXIR that are neglected because of EXIR promotion. IBPGR's representatives may well lose even more credibility in such cases.

50. EXIR does not appear to be cost effective. Packages having all of the capability of EXIR plus a full range of statistical routines can be acquired for much less. Several CG institutes appear to have obtained the capabilities of EXIR at costs well below its estimated cost per installation.

### 3.3 Micro-Computer Based System

51. This system consists of both a computer and a software collection. It appears to be able to handle germplasm data entry and most retrieval operations needed for germplasm collections of small size. It is in an early developmental stage in terms of software, documentation, and knowledge of reliability and problems.

52. This kind of system could be valuable for introducing computing in situations where data storage and retrieval would otherwise be impossible. However, it should be observed that the micro-computers now in use could be perceived as a solution to general computing needs in situations where larger and somewhat more expensive machines would be more suitable.

53. It should be recognized that an involvement of IBPGR in the distribution of micro-based systems carries with it the potential liability for costs associated with continued maintenance of hardware and software.

54. It is too early to assign benefits to this project. This project is unlikely to provide a general solution because of national differences in customs, support services, etc. but a micro-based approach could be helpful in many cases.

### 3.4 General Observations

55. The most common reaction to the costs and benefits for the tangible products of the Boulder group seems to be that rather limited gains have been made at a high cost. Over and over this group has reported new, often very sensible, undertakings followed by nothing tangible. Projects seemed to have been identified for action and then apparently forgotten. New enthusiasms seem to have consistently taken precedence over completing older undertakings.

#### 4. Sponsorship of Hardware and Software; Payment of Development Costs

56. The micro-based system is an interesting project and it may merit considerable additional investment. It should not be financed by IBPGR just as further development and distribution of EXIR should not be promoted by IBPGR. IBPGR should not be in a position of sponsoring hardware or software because:

(i) It is an organization pooling skills involving germplasm and is not a natural depository of computing knowledge and experience. It is not in a good position to supervise or evaluate computer projects.

(ii) IBPGR should be in a position that favors the objective assessment of options when a client is considering computing alternatives. That is less likely to occur when the success of an IBPGR development project is weighed in terms of frequency of adoption. It is less likely to occur when those providing advice are much less familiar with alternatives than with the materials they have developed or are sponsoring. Even though the current official position on EXIR is that it is nothing special and not worth the cost of maintenance support, shipment of EXIR to IITA and ORD<sup>1/</sup>-Korea is pending. Both institutes have the same equipment as ICRISAT which has its own system operational. It is not clear that EXIR is operational for the computers of those institutes.

(iii) IBPGR has to be in a position of trust with its clients or prospective clients. That position is put in jeopardy by sponsorship of products that will not always be the best available. It is also put in jeopardy by failing to provide maintenance for products promoted by IBPGR.

#### 5. Computing - A Wider Context

57. The Panel met with four of the persons who are (or were) actively involved in promoting the development of the germplasm information network. Each stated the same message, a message that most of us had already heard from CG centres and other sources. The following emerged:

(i) Management of germplasm information is a low priority item for most, if not all, centres that belong in the CGIAR system. When computing activities for an agricultural organization are considered, germplasm data management is an infrequent activity that has to be reconciled with many, many other activities. It is not just germplasm that is endangered. Research results are just as perishable and sometimes much more urgent.

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1/ ORD = Office of Rural Development.



(ii) Promotion of germplasm data management without regard to other computing needs is ill-advised and sometimes could be expensive. There are times when doing so makes it less likely that an organization will be disposed to cooperate with IBPGR programmes.

(iii) Satisfying the computing requirements of a germplasm network is more likely to occur if IBPGR is perceived as supporting a balanced approach to the computing needs of its potential clients than if IBPGR is perceived as promoting over-emphasis on germplasm data management. As it is now being pursued, the current micro-based technical assistance effort could be an unbalanced promotion of germplasm needs.

## VI. FUTURE NEEDS AND DEVELOPMENTS

### 1. General

58. In the light of conclusions reached in preceding paragraphs, the Panel identified three key areas for IBPGR activities, namely:

- (a) The assembly of catalogues of collections and of genetic resources workers; this work has already begun but should be accelerated.
- (b) The development of agreed descriptor lists, crop by crop, and their translation into computable form; this work, too, has begun but it, too, should be accelerated.
- (c) The promotion of a basically new attitude to computing founded on the substitution of a dispersed system of ad hoc arrangements for highly specific purposes for the present heavy commitment to a single centre on a long-term basis.

59. Items (a) and (b) in the preceding paragraph call for no elaboration. They are fundamental to the development of any information system and serious computing work in any crop is impossible until they shall have been satisfied. The Panel noted that progress has been made in both but that there is yet a very long way to go.

60. Item (c) in paragraph 1.1 proposes a radical change in current arrangements. It is founded on the beliefs that, despite some useful achievements in the development of EXLR, the process was not cost-effective (page 15) and that commitment to a single source of computing expertise is risky and inefficient. The Panel noted that computing skill is widely dispersed through the world and that specific questions could usually be matched by specific expertise. The Panel therefore concluded that the Board would do well to adopt the following principles:

- (a) identify specific, limited problems;
- (b) identify appropriate consultants by way of institutional mechanisms discussed later herein;
- (c) negotiate or help others to negotiate agreements (usually of a relatively short-term nature) to attack those problems;
- (d) avoid long-term commitments to any specific consultants, systems or hardware.

61. The Panel thought that items (a)-(c) should improve cost-effectiveness of the whole and that item (d), as an act of policy, was important in guaranteeing and being seen to guarantee the Board's objectivity.

62. Specifically, the Panel suggests:

- (1) The immediate formation of an ad hoc committee to assist the Executive Secretary in producing a directory of persons and products that might be useful in meeting computing needs for germ plasm information. This group should be drawn from a variety of sources representing as much variation in computing backgrounds as practicable. It should have a definite target date for completing its task and should recognize that it is being asked to provide a first approximation rather than a polished product. This temporary committee should also develop plans for periodic updating of this directory by the Secretariat.
- (2) The formation of an advisory committee that will report to the Executive Secretary and will assist in the process of identifying and monitoring sources of advisory help in computing. This committee should emphasize diversity of backgrounds and include some persons who are well informed on germ plasm information problems, and some who are knowledgeable about general computing needs in agricultural organizations. Members of this committee will not serve as computing advisors, but will advise the Executive Secretary on persons suitable for this work and later assist in assessing the performance of advisors.
- (3) Neither the ad hoc committee nor the advisory committee should contain representatives of computer manufacturers, software houses, or other vendors of computing products. Appointments suggestive of conflicts in interest should be carefully avoided.

## 2. Contents of the Core Programme

63. After deliberation, the Panel agreed that the following activities should be maintained in the core programme of IBPGR in the field of genetic resources information:

- (a) the development of agreed minimum descriptor lists and their translation into computable form;
- (b) the promotion of machine-readability of genetic resource information;
- (c) the provision of maintenance services to existing users of EXIR;
- (d) small ad hoc software developments.<sup>1/</sup>

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<sup>1/</sup> Although the Board agreed in February 1979 that no major software development should continue, the development of the micro-computer based system still involves some software development.

64. The Panel also recommended that the following activities should be added to or strengthened within the core programme:

- (a) the assembly of directories of existing collections, institutions and research workers involved in genetic resource conservation;
- (b) the provision of advisory services of short duration to institutions engaged in the development of genetic resource information systems in developing countries and the promotion of longer-term arrangements for advisory services and technical assistance;
- (c) regional consultations on the development and use of genetic resource information systems for specific crops;
- (d) training in matters relevant to the core programme.

65. The Panel considered that certain ongoing activities should not be included in the core programme of IBPGR. These are the following:

- (a) technical assistance to national genetic resource information programmes;
- (b) the sponsorship and supply of specific hardware and software;
- (c) any substantial development activities of new software for genetic resource information systems;
- (d) any software development concerned with the processing of data that is not directly a part of genetic resource work (e.g. plant breeding, statistics, operational research, management and accounting).

66. The exclusion of the above activities from the core programme of the IBPGR as recommended above should not be interpreted as negating the very useful catalytic role which the Board should play by means of special projects and promotion of technical assistance by other institutions.

## VII. CONCLUSIONS AND RECOMMENDATIONS

67. Before presenting its conclusions and recommendations, the Panel notes that a number of difficulties were experienced in the accomplishment of the mission. A thorough assessment of the impact of the IBPGR programme at Boulder would have required a series of consultations with international and national genetic resources centres. This did not prove feasible and will have to be made as part of the broader evaluation of the impact of IBPGR when the quinquennial review is carried out. More time would have been necessarily also for discussions with members of the Board, of the Advisory Committee and also of TAC and CGIAR in order to understand fully their attitudes vis-a-vis the programme under review. Finally, the Panel could not examine the future plans of IBPGR for this programme beyond 1979 as these were being prepared at the time of the review.

68. The Panel therefore recommends that its conclusions and recommendations should be considered essentially as an input in a wider process of review of IBPGR activities.

69. The Panel stresses that the establishment of an international system of information, documentation and communication on plant genetic resources is an essential complement to the international efforts of the Board in ensuring the collection and conservation of plant genetic resources. These conservation and collection efforts would have little value if the collections were not adequately documented and if this information were not readily accessible by the users, first, for monitoring the collection and conservation process, and, second, to facilitate the distribution and use of material on request. Another justification for the work of the IBPGR in this field is the major catalytic role which the development of an international information system is likely to play indirectly in inducing a better organization and management of the existing collections and in identifying gaps which in turn will call for further exploration and conservation work. For these reasons, the Panel recommends that IBPGR continue to devote a substantial portion of its resources to the field of information. This however calls for significant changes in the present programme as indicated below.

70. The Panel recognizes the many difficulties and obstacles faced in the development of an international information system on plant genetic resources. This is an enormous task. Progress has been slow and TAC/CGIAR should not expect spectacular results or a completion of this work in the next couple of years. It may well take 15 - 20 years to establish genetic resources collections for major crops and the associated international programme of information, documentation and communication. Any assessment of the results of the programme should take into account the magnitude of the task and the problems involved.

71. The leading result of the Boulder programme is an increased awareness and an improved understanding of the needs and problems. This programme should be seen as a pilot experiment in which different concepts, approaches and techniques were successively tried and which provided valuable experience for all concerned.

72. Nevertheless a number of results have been achieved already. This includes: (a) the development of the EXIR system, a system which is a collection of programmes for storing and managing genetic data; (b) the development of personnel having expertise in this field. This expertise has now spread not only to other places in United States but also through the training and cooperative programmes promoted at Boulder to a number of developing and developed countries. (c) In cooperation with the Crop Advisory Committees, the development of common sets of descriptors for cataloguing the collections of several crops. Although there is still a long way to go before a wide-scale adoption and use of these descriptors, they constitute an essential step in that direction. (d) Stimulation of the cataloguing of the material contained in certain collections. A significant result, which is not entirely attributable to IBPGR but to which IBPGR has contributed significantly, is the development of a programme of systematic cataloguing of one of the largest sets of genetic resources collections of the world, that of the United States. The programme has also assisted several IARCs in their work in this field, and accelerated recently its technical assistance to several national collections in developing countries, in Latin America in particular.

73. The problems now before the IBPGR relate essentially to the scope and priorities of its future work and to its organization and management:

(a) The Board is confronted with a situation where a series of IARCs and national programmes in developed countries are already well advanced in the development of their genetic information systems for specific crops but usually with different software and hardware. It is very unlikely that these advanced programmes will now change their information systems to any significant extent. This may not be necessary, however, as they are or may be made sufficiently compatible for the purpose of communication of information and exchange of genetic material.

(b) Most of the national collections in developing countries have yet to be catalogued and documented. This offers considerable opportunities for developing internationally compatible information systems but requires also a considerable amount of specialized advisory services, personnel training and equipment for a long period.

(c) Most of the centres, national or international, wish to develop data systems and install hardware which would not exclusively deal with genetic conservation aspects but also serve their needs for data processing in the field of plant breeding and other areas of agricultural research. Germplasm considerations should not be expected to dominate their choices.

74. IBPGR cannot attend to all these problems and should take note of the diversity of requirements by national and international institutions, in developed and developing countries, both in the narrow field of genetic resources information and in the adjacent fields of agricultural research. IBPGR should enhance consultation among users and invite their active participation in planning and priority-setting.

75. The Panel does not propose to define a structure and set priorities for the future programme since it had not the opportunity to review other related aspects of the IBPGR programme. Nevertheless some relevant points should be indicated:

(a) Although efforts to develop individual data bases in a standardized manner should continue, the primary requirement is the assembly of directories of existing collections, crop by crop. This task which is truly international in character should be part of the core programme of IBPGR and should be carried out centrally by its Secretariat with the help of the appropriate Crop Advisory Committees and working groups.

(b) Of equal priority is the continuation (through the core programme) of the development of minimum descriptors. This long-term task is also truly international in character and should be promoted by the IBPGR and its Advisory Committees.

(c) The Board should provide ad hoc advisory services to address the needs of organizations wishing to manage and exchange germplasm data. This should be done on a world-wide basis and make use of as broad a range of skills and backgrounds as possible. Ordinarily the funding of these activities will be by special project or bilateral arrangements except as needed for short-term (up to 4 weeks) assessments of needs and resources.

(d) The Board should not promote a world-wide adoption of any particular software or hardware but rather sponsor and sometimes support with its core resources, quite limited initiatives aiming at facilitating the compatibility of existing and future software and hardware systems so as to provide for international communication between these systems.

76. The Panel recommends that, when considering the above observations on the future information programme of IBPGR, the Board assesses the organizational and managerial implications of these changes. In particular, it seems essential that a new organizational structure provides the Secretariat with a clear responsibility and authority for programme formulation, implementation and budgetary control. All aspects of the programme will have to be considered in this context, but the Panel wishes to stress the need for giving greater responsibility to the Secretariat in formulating programme and budget proposals and in implementing the programme with any necessary technical guidance which the Secretariat may call upon for the purpose. The Board should also develop a mechanism for scrutiny of programme proposals and of progress reports similar to those adopted by programme committees of the IARCs. In addition, the Secretariat should establish an expert group to advise on information-computing matters.

77. The Panel sincerely hopes that these recommendations will assist the Board in its efforts to promote international information exchange and communication on genetic resources; this profoundly important role should, the Panel believes, receive the full support of the CGIAR. The Panel further recommends that IBPGR with the help of the above recommendations, should formulate a detailed plan of work and budget for the next two years; these should be examined by TAC in the light of views expressed in this report. TAC may then wish to refer such questions as may arise to the Quinquennial Review Panel.



List of Questions

1. Is there a broad agreement among the main potential users and beneficiaries of the programme on the general principles of cooperation and on common concepts and approaches regarding the establishment of an international information system on plant genetic resources?
2. To what extent and how were the diverse users concerned (IARCs, national programmes in developing and developed countries ...) consulted before and during the implementation of the programme? If necessary, what would be the mechanism to improve these consultations?
3. What is the structure contemplated for the international information network? How does this structure relate to that of the IBPGR, its crop advisory committees, working groups, its regional programmes and the global network of genetic resources centres, to the CGIAR system, to the national programmes and regional (EUCARPIA) and international (FAO) institutions?
4. What are the past and present roles of the different parties concerned\* in the forward planning, formulation of the programme, decision-making, implementation and accountability?
5. What were the nature of, and the reasons for, the successive changes in the programme? How these changes relate to the mandate of IBPGR?
6. What is the degree of universality and versatility of the system developed by IS/CR as regards the different crops concerned, the number and type of characteristics to be handled, the compatibility with other existing systems, its use with different types of computers? Why is the system being adopted (or adapted) by some institutions and not by others? What are the main obstacles and constraints on the adoption and use of the system by the IARCs, by national programmes in developing countries, by national programmes in developed countries? What is being done by the programme to overcome these obstacles and constraints?
7. To what extent the lists of descriptors prepared for different crops are internationally accepted and provide for reliability and consistency in the description of the material and the information exchange? If necessary what should be the mechanisms to improve them?

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\* IBPGR (its Board, its Executive Committee, its Advisory Committee, its Secretariat), FAO, the University of Colorado, donors, users, etc.

8. How was the balance maintained between international and national interests in the programme; between different functions of the programme (system development, data base development, system implementation, research, technical assistance and training); between different uses of the system?

9. What are the criteria and procedures used in identifying the institutions which cooperate with the programme and/or receive technical assistance from it? What are the principles and factors considered in allocating resources of the programme to cooperative activities with specific international and national centres?

10. Among the functions of the programme, what are those which correspond to continuing international requirements and those which are more limited in scope and duration? What are the priorities among these requirements? How should computing requirements of genetic resources information programmes be related to the other computing needs of agricultural research? To what extent (and why) should these needs be covered by IBPGR or by other sources of funding within the CGIAR or outside?

11. What was the rationale for the location of the programme at Boulder? Is this location still valid in the light of the changes brought to the programmes?

12. Are the present programme and resource allocation by the IBPGR reflecting the priorities? How would the programme and the budget be expected to develop over time? Would this affect the relationship and the distribution of responsibilities established between the Board, its Executive Committee, its Advisory Committee, the Secretariat, the University of Colorado, the IARCs and the institutions involved in the funding of the programme?

List of Background Documents for the Mission

1. IBPGR documents

(i) General

A Review of Policy and Activities 1974-78 and of the Prospects for the Future (AGPE:IBPGR/78/24 - Fifth Draft)

A World Plan for Crop Genetic Resources Exploration 1980-1985 (AGPE/IBPGR/79/1)

The Documentation of Plant Genetic Resources - A Background Paper by D.J. Rogers (AGPE:MISC/4)

Work Plans for Genetic Resources Communication, Information and Documentation Systems (GR/CIDS) (AGPE:IBPGR/74/4C)

Extracts from the Minutes of the IBPGR Executive Committee Meeting and IBPGR Plenary meeting.

(ii) Progress Reports

Report dated 28 March 1975 (AGPE:IBPGR/75/19)

GR/CIDS Project Report to IBPGR and FAO (AGPE:IBPGR/75/35)

GR/CIDS 1975 Progress Report to IBPGR and FAO (AGPE:IBPGR/75/42)

IS/GR Annual Report 1976

(iii) Short Training Courses in Genetic Resources Information Systems

Report on the 1977 IS/GR Short Course (18 July to 26 August 1977)

Report on the 1978 GRIS Short Course (5 June to 14 July 1978)

(iv) Contracts

FAO Contract for 1975 (IBPGR funded)

FAO Contract for 1976 (IBPGR and FAO funded)

FAO Contract for 1977 (IBPGR funded)

IBPGR Letter of Agreement in support of programme in 1978 (IBPGR funded)

IBPGR Letter of Agreement in support of programme in 1979 (IBPGR funded; note some amendments are proposed to the Work Plan)

(v) The Current Work Plan 1978-79

IS/GR Last Quarter Report (Part I) and Work Plan for 1979 (Part II)

(vi) IBPGR Advisory Committee on the Genetic Resources Communication,  
Information and Documentation System (GR/CIDS)

Terms of Reference (AGPE:IBPGR/75/43)

Report of First Meeting (AGPE:IBPGR/76/7)

Report of Second Meeting (AGPE:IBPGR/77/6)

Report of Third Meeting (AGPE:IBPGR/77/36)

Report on visit to Boulder and Fort Collins, Colorado, 12-19 October 1978  
by R.H. Demuth, J.T. Williams and A.H. Bunting (AGPE:IBPGR/78/38)

(vii) Descriptors

Descriptors for Wheat and Aegilops (AGPE:IBPGR/77/20)

Descriptors for the Cultivated Potato by Z. Huaman, J.T. Williams,  
W. Salhuana and L. Vincent (AGPE:IBPGR/77/32)

2. TAC Documents

Extracts from the minutes of the TAC Meetings no. 1, 2, 3, 4, 5, 6, 8,  
9, 10, 13, 14, 16, 18, 19. TAC Secretariat, FAO, Rome

3. Others

- IS/GR Annual Report 1977. University of Colorado, Boulder, U.S.A., 1978.
- GDM - A computer based germ plasm management system. IS/GR University of Colorado, Boulder, March 1979
- Plant Genetic Resources Conservation and Use. National Plant Genetic Resources Board - USDA, March 1979
- IBPGR Advisory Committee on Information Management - Prospect for the Future - a personal view by A.H. Bunting. April 6, 1979

Mandate of IBPGR

Terms of Reference

The Board will have responsibility, under the authority of the CGIAR, for recommending policies and developing programmes in close collaboration with and with the help and advice of FAO to meet the following objectives:

1. To identify general and specific needs for exploration, collection, conservation and evaluation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities among them and to ensure to the fullest possible extent that the materials conserved are made available for plant breeding and other scientific activities as required;
2. To establish standards, methods and procedures for exploration and evaluation and to determine minimum standards for conservation and regeneration of stocks of both seeds and vegetative material;
3. To arrange for replicated storage of seed and vegetative stocks;
4. To promote technical meetings;
5. To promote training activities at all levels;
6. To develop a world-wide network of institutions, organizations and programmes able and willing to contribute to the above objectives;
7. To promote the articulation of ongoing programmes so as to avoid unnecessary duplication and to fill in gaps;
8. To strengthen the programmes of existing institutions and to encourage the establishment of new organizations, institutions and programmes to the above ends, where necessary, particularly in the areas of major genetic diversity;
9. To promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections;

10. To make appropriate recommendations with respect to computerized information, storage and retrieval systems, taking into account their suitability for an effective international genetic resources network, and their compatibility with existing systems already in operation at some regional and national centres;
11. To estimate the annual financial requirements of those parts of genetic resources programmes not already adequately covered.

The Board's activities will be confined exclusively to the achievement of the foregoing objectives.

Post Description of a Genetic Resources Officer (Information)

Under the direct supervision of the Senior Genetic Resources Officer and Executive Secretary of the IBPGR:

- update, review and analyze genetic resources data and documentation including ongoing activities on a world basis;
- provide technical advice on genetic resources, and coordinate replies to complex enquiries through specialized institutions;
- act as Technical Secretary to the IBPGR Advisory Committee on Genetic Resources Communication, Information and Documentation Systems;
- carry out specialist investigations at the request of the IBPGR Committee and Executive Secretary;
- write technical reports in the field of genetic resources documentation and information;
- establish links between the IBPGR Secretariat and computer experts in FAO;
- perform other related duties as required.

ANNEX V

1. EXIR Users

- EMBRAPA - Brazil
- USDA
- PBI Cambridge, UK
- Washington State University
- Legendre - Canada
- Wagner - Des Moines Iowa
- University of W. Australia
- Birmingham University - U.K.
- Jerusalem University - Israel
- University of Bari - Italy
- CIMMYT - Mexico
- Perth - Australia
- Iowa State
- INIA - Argentina
- ISRAEL
- Izmir - Turkey
- Japan IBM Scientific Centre

2. Descriptor lists developed by IS/GR

- Wheat Aegilops
- Potato



THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Twenty-Second Meeting, Hyderabad, India, 3 - 10 July 1979

TAC QUINQUENNIAL REVIEW OF IBPGR

PROGRESS REPORT, JUNE 1979

(Agenda Item 6)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome 1979

## TAC QUINQUENNIAL REVIEW OF IBPGR - PROGRESS REPORT JUNE 1979

### Decisions Taken at the 21st TAC Meeting

1. The 21st TAC Meeting reiterated its conviction that a full-scale review of IBPGR was called for. As the review was being postponed, it was agreed that consultancies should be held on certain aspects of the Board activities. These consultancies were envisaged to cover the IBPGR genetic resources information programme at Boulder, Colorado, and the management of the activities financed through the Board. It was also recommended that, whenever possible, the same persons should carry out the consultancies and the quinquennial review.

### Recent Developments

2. A mission, paid out of the TAC Secretariat funds, visited the IS/GR programme at Boulder and reported to the Chairman of TAC and the Chairman of IBPGR in April 1979. A first draft of the TAC mission report was made available to the Secretariat and to the Executive Committee of IBPGR which met in May 1979. Their comments were taken into account for the final editing of the report, which has now been distributed to TAC members for this 22nd TAC Meeting (see document AGD/TAC:IAR/79/18.Rev.1).

3. The TAC mission report also generated further in-house discussion. The Executive Committee, which met again in June 1979 together with several consultants, took action already on some of the recommendations made by the TAC mission and formulated a new information programme which is now for consideration by TAC 1/.

4. After consultation between the TAC Chairman and the IBPGR Chairman, it seems that the question of IBPGR management and decision making process could be handled by the quinquennial review panel itself.

### New Arrangements Proposed for the Quinquennial Review

5. The budget for the quinquennial review had been originally earmarked by IBPGR for \$ 35,000. In the first progress report, the budget level had been estimated by the TAC Secretariat at \$ 68,000. However, in the proposed mid-term 1979-80 budget revision 2/, a figure of \$ 50,000 has been included by IBPGR. It is proposed to try to stay within these financial limits by restricting regional travelling, limiting the team for each of these regional visits to a panel member and a TAC Secretariat member and making most use of local IBPGR staff. It is understood that IBPGR may have to use some of its contingency funds (total of \$ 100,000 in 1979) if necessary to cover possible cost increase of the quinquennial review (airfares, etc.)

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1/ IBPGR Revised Mid-Term Report on the Programme and Budget, June 1979, AGP/IBPGR/79/21, revised 28.6.1979.

2/ ditto, Table I

6. Unfortunately, Dr. M.S. Swaminathan, who was foreseen to lead the review as well as the regional visit to Latin America, is not available any more due to his new and important functions. The new review schedule and personnel are now proposed as follows.

#### Regional Tours

a) Near East/Mediterranean area:

Visits to Bari (Italy), Izmir (Turkey), Beirut (ICARDA).

Panel member: Prof. Åberg <sup>1/</sup> accompanied by Mr. Ochtman (TAC Secretariat)

Dates: 9 days during the period 24 September to 9 October

b) Latin America area:

Visits to CIMMYT (Mexico), CATIE (Costa Rica), CIP and the national programme (Peru) and Brasilia.

Panel member: (vacant), accompanied by Mr. Mahler (TAC Secretariat)

Dates: to be determined - 13 days would be necessary.

c) Far East area:

Visits to IRRI (Los Banos, Philippines), Bogor (Indonesia), ICAR (New Delhi), ICRISAT (Hyderabad)

Panel member: Prof. Simmonds <sup>1/</sup> accompanied by Mr. S. Risopoulos (TAC Secretariat)

Dates: 15 - 28 October

#### Quinquennial Review Panel

Chairman: to be selected from the panel members

Members: panel members

Secretary: Mr. S. Risopoulos

Place: Rome

Dates: 3 - 8 December 1979 <sup>2/</sup>

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<sup>1/</sup> Member of the TAC Mission to Boulder

<sup>2/</sup> 6 days may not prove to be sufficient unless some preparatory work in the form of a draft report is prepared in advance by the Chairman with the help of the Secretariat.