

Report of a Barley Workshop

Held in Gatersleben

19-20 November 1985

UNDP/IBPGR EUROPEAN COOPERATIVE PROGRAMME FOR CONSERVATION AND EXCHANGE OF CROP GENETIC RESOURCES



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EUROPEAN COOPERATIVE PROGRAMME FOR THE CONSERVATION
AND EXCHANGE OF CROP GENETIC RESOURCES

REPORT

of a Barley Workshop

held at
Zentralinstitut für Genetik und Kulturpflanzenforschung,
Gatersleben, German Democratic Republic,
19-20 November 1985.

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INTRODUCTION

The Workshop was convened in order to develop a long-term strategy for the Barley Working Group organized by the European Cooperative Programme for Conservation and Exchange of Crop Genetic Resources (ECP/GR) and for the further registration of data in the European Barley Data Base (EBDB) particularly orientated towards users' needs. The Workshop was held at the Zentralinstitut für Genetik und Kulturpflanzenforschung (ZIGuK), Gatersleben, German Democratic Republic, 19-20 November 1985. A list of participants is shown in Appendix I.

The participants were welcomed by Prof. R. Rieger, Vice-Director of ZIGuK. Mr. P.M. Perret (ECP/GR Coordinator) informed the participants of results of a survey on barley breeding information needs, conducted by the ECP/GR Secretariat by means of a questionnaire, which had been sent to 150 breeders throughout Europe. Forty-three completed questionnaires had been received and the results of the survey were tabled (see Appendix VII).

Mr. Perret explained that participants were convened in their individual capacities as scientists, and that they should openly express their expectations from an international data base for barley genetic resources without regard to practical constraints which could be faced in realizing the objectives they assigned to such a data base. Their recommendations would be submitted to the second meeting of the ECP/GR Barley Working Group, scheduled for May, 1986 as well as to the Technical Consultative Committee, which reviews planning and progress of the ECP/GR, for further discussion.

Members of the Workshop decided that no Chairman was needed to lead the meeting and adopted the Agenda (Appendix II).

REPORT

The European Barley List and identification of duplicate accessions

1. Dr. Ch. Lehmann of ZIGuK presented achievements to date of the EBDB and outlined the ongoing activities. A detailed status report on the implementation of the data base is provided in Appendix III. It appeared that users are not fully aware of the existing network of European genebanks and furthermore that most breeders did not know which kind of services the EBDB was able to offer to them. Some suggestions were given which are expected to promote the activities of the EBDB and consequently the activities of the national genebanks (see para. 14).

 2. The Workshop, following a study of the draft of the European Barley List, agreed that the latter should be considered as 2 parts:
 - Named accessions which include cultivars; and
 - Unnamed accessions which include most accessions collected in the field.

The problem of identification of duplicates was discussed on the basis of a paper prepared by Drs. Lehmann and Knüpfer entitled "Identification of Duplicates in the EBDB" and provided in Appendix IV.

 3. For each named accession it was recommended that the EBDB should search among the duplicates having the same cultivar name for the accession(s) which best represent the known complex of characters of the original variety (in most cases this will be the accession which is maintained in the country where the cultivar originated) and indicate it in the European Barley List as the best representative of the cultivar. It was agreed that there was no practical need at least for users to preserve duplicates in this category (except for safety duplication).

 4. Two means of handling the group of unnamed accessions, which mostly represent collected populations, were considered. Firstly, in the case of populations which for regeneration purposes had been divided into lines following distinct morphological characters and in which specific information was available for each line of the population, it was agreed that such lines should be handled in the EBDB in the same way as that for the named accessions (see para. 3). Secondly, in the case of unnamed accessions which were regenerated as a population the Workshop considered that it would be impossible to identify real redundant duplicates. Furthermore in this second category breeders are looking for specific characters which may eventually be lost or acquired during the regeneration procedures and therefore every putative duplicate should be maintained.
- Further registration of data into the EBDB or at a national level
5. The Workshop examined which passport descriptors could be of the utmost importance to users and agreed that the following descriptors: "Location of collection site", "Latitude", "Longitude" and "Altitude" should be registered in addition to the descriptors already included in the EBDB. For cultivars the year of registration or preferably the year of release is of great value and should also be registered. The complete list of passport descriptors which should be handled by the central data base is shown in Appendix V. It was recognized that some users (e.g. phytopathologists, geneticists) would for specific research purposes need more detailed passport

descriptors and it was agreed that in this case they should seek further information from the national genebank holding the material.

6. The Workshop discussed in detail the users' needs for characterization/evaluation data taking into account the responses received in the survey of information needs (Appendix VII). It was considered essential that information be handled in a central data base in a uniform and comparable way. Therefore a list of characterization/evaluation descriptors was recommended for incorporation into the EBDB. Considering the practical constraints for observing and registering all these data, 3 levels of priorities were established. The list of recommended data with their respective level of priority is shown in Appendix VI.

7. It was recognized that a large amount of valuable information was available from various sources outside genebanks and breeders' circles. Whilst recognizing that collating this information will be a very long-term task, the Working Group recommended that it be initiated. It was agreed that this was the duty of each national genebank. All users should be encouraged to send voluntarily this kind of information to their national genebanks.

Establishment of reference collections

8. Prof. Wolfe had prepared a list of more than 300 cultivars categorized according to mildew resistance phenotype. Examples of each group could be used as the reference for the particular phenotype. The meeting welcomed this list as an extremely valuable contribution and recommended firstly, that these indicator cultivars be gathered in genebanks as a kind of reference collection and secondly, that this collection should be extensively used as a standard in any screening for mildew resistance (field or laboratory).

9. It was noted that lists of similar representative material for other diseases are under preparation in various countries. It was recommended that adequate support be given by Governments for this activity; the availability of such standard material for the most important diseases will be a significant step towards improving the evaluation of collections.

Most limiting factor in barley breeding

10. Dr. Blixt made a plea for concerted efforts by genebanks to resolve a limiting breeding problem. The Workshop reviewed at length the most limiting factors for barley breeding. It was mentioned, for example, that a further screening for malting quality, especially for material from central Europe, would be highly useful. The development of pesticide resistance in aphids can be expected in the future and therefore new genes for resistance should be found for Barley Yellow Dwarf Virus. Additionally it is possible that some resistance has evolved in Ustilago nuda to fungicides. Closed flowering could be a protective mechanism and it would be most useful to screen for this character.

11. The meeting agreed that the most limiting factor in barley breeding for higher yield was that short straw is apparently always concomitant with short roots. It was recommended that a screening should be undertaken in sufficient depth to conclusively determine whether or not the combination short straw/long roots was available in the barley collections. Either a positive or a negative outcome could be of value as in the first case breeders would have access to this material directly and in the second the matter could subsequently be dealt with either through mutation or biotechnical procedures.

Information flow

12. The Workshop discussed the channels through which information could most effectively flow from the EBDB to breeders. It was recommended that breeders should always address in the first instance their own national genebank and that this genebank should, as a service institution, query information from the EBDB in addition to information on material existing in other genebanks.

13. It was stressed again that users accepting material from genebanks must agree to return any information derived during the use of the material. It was suggested that the genebanks should develop means which make the return of data as easy as possible for breeders.

14. It was suggested that the EBDB and the IBPGR promote more intensively the services which are offered by the national genebanks and the EBDB by submitting articles in recognized journals such as Euphytica, Crop Science, etc., and by presenting papers during symposia and meetings organized by barley specialists.

Other matters

15. It was agreed that genebanks had responsibility for maintaining cultivars when they become discarded from general use. There is no obligation to provide cultivars obtainable from commercial sources, but genebanks should, as far as possible, help users to find recent variety releases.

APPENDIX I

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APPENDIX II

AGENDA

1. Opening
2. Election of Chairman
3. Presentation of the European Barley Data Base
4. Identification of duplicates
 - 4.1 Methodology
 - 4.2 Rationalization of collections
5. Further registration of data into EBDB or at the national level
 - 5.1 Passport data
 - 5.2 Characterization/evaluation data
 - 5.3 Data from various scientific publications
6. Concerted genebank efforts to resolve a limiting factor in barley breeding
7. Distribution of information from EBDB to genebanks and breeders
8. Other matters

APPENDIX III

STATUS REPORT OF THE EUROPEAN BARLEY DATA BASE EBDB

The work with barley within the ECP/GR was initiated by 2 meetings of a Working Group held at ZIGuK, Gatersleben, German Democratic Republic, 3-4 February 1982 and 18-19 May 1983. In the second meeting first priority was given to the production of a Catalogue of European Barley Genetic Resources (European Barley List - EBL) on the basis of a computerized European Barley Data Base (EBDB). In this phase, first priority was given to passport data. In 1983 ZIGuK had been designated by ECP/GR to establish and to maintain this EBDB.

The aims of the EBDB, as set out by the Working Group, can be summarized as follows:

1. The complete compilation of information on barley genetic resources in European barley collections - both state and private organizations of countries participating in the ECP/GR - based on passport and characterization (only partially at the present time) data using the standard IBPGR descriptor list by the end of Phase II of the ECP/GR in 1986. This information is freely available for national genebanks (data bases), breeders and research workers;
2. The promotion of the free exchange of germplasm between genebanks and between genebanks and breeders or research workers;
3. The detection of gaps in the representation of barley germplasm in collections (mainly old cultivars and landraces) and the filling of these gaps as far as is still possible;
4. The registration of unique accessions and the maintenance of a duplicate for safety;
5. The registration of replications of accessions (potential duplicates); and
6. The rationalization of collections by agreement between participating collections (genebanks, etc) with consequent elimination of potential waste of resources in the maintenance of redundant accessions.

The steps involved in establishing the EBDB and pertinent experiences obtained are as follows:

1. In 1983 and 1984 barley collections in ECP/GR participating countries were invited by the ECP/GR Secretariat to send via Country Coordinators passport data of their accessions in typewritten or computer printout form to ZIGuK, Gatersleben, for registration on diskettes in a unified form, or to Dr. S. Blixt, Weibullsholm Plant Breeding Institute, Landskrona, Sweden, on magnetic tapes, respectively.

At the Barley Working Group Meeting in 1983, Dr. M. Worede, Director, Plant Genetic Resources Center/Ethiopia, offered incorporation of passport data of the Center's Ethiopian barley collection into the EBDB.

The limited hardware and software facilities of ZIGuK (microcomputer with diskettes of capacity 800K bytes, and lack of appropriate data management software available) did not allow the accommodation of all data. Therefore, Dr. Blixt was asked to set up a temporary data base.

APPENDIX III (Continued)

2. On 27 June, 1985 the equipment needed to accommodate the complete EBDB was installed at ZIGuK. The EBDB compiled by Dr. Blixt up to July 1985 contained passport data on 49,767 accessions from 25 collections in 21 countries. From this data base an alphabetically sorted list was produced by 10 July. In June and August 1985 Dr. Blixt delivered magnetic tapes with all data to the Nordic Gene Bank for transfer to ZIGuK on diskettes. These data consist of separate files for each of the contributing institutes containing:
 - (a) The unchanged original data as received from the collections and;
 - (b) Some additional data fields transformed and standardized by Dr. Blixt. ZIGuK has gathered additional data on 936 accessions in computer-readable form which are not included in Dr. Blixt's last edition of EBL.

3. Most of these diskettes arrived at ZIGuK during October/November 1985 and therefore, further treatment of the data base to date has been limited. ZIGuK had not yet received data obtained by Dr. Blixt after 10 June, i.e. from Bulgaria and the Netherlands. Countries with recently re-edited data tapes had not sent them to Dr. Blixt, i.e. Spain and UK. The EBDB expects to receive further passport data from institutions in Italy (besides Bari), the Nordic Countries (at present there are data from one station in Denmark, one station in Norway, and two stations in Finland; other important collections, e.g., Svalöf and Weibullsholm are lacking), Portugal, other Yugoslavian institutes, and additional data from Ireland.

4. The further treatment was limited mainly to:
 - (a) A manual search for duplicates and counting of collected material from different countries in the alphabetically sorted printout of the data base with a limited number of passport data, received by ZIGuK in July; and
 - (b) The construction of the Gatersleben EBDB including all data available on diskettes up to the end of October 1985 (cf. para. below)

5. Of the 49,767 accessions in the EBL of July 1985 there are 22,952 "cultivars" (including named cultivars, breeder's lines, genetic stocks, mutants, etc.) and 26,815 unnamed "landraces" (collected populations, selected lines from landrace populations, etc.). (These figures are derived from the manual count in the printout.)

Among the 22,952 "cultivars", 2,681 "duplicate groups" have been detected on the basis of accession names comprising 11,561 accessions. The remaining 11,391 named accessions seem to be unique at a first glance, i.e. there may be not more than 14,072 different named accessions. The most common "cultivars" are 'Algerian' (24 occurrences), followed by 'Herta' and 'Trumpf'/'Triumph' (22 occurrences each) (cf. Appendix IV).

The unnamed 26,815 accessions originate from 70 countries (25,419 accessions), among them 12,418 from Ethiopia, 2,341 from Turkey and 2,017 from Nepal), and 8 geographical regions (204 accessions). The country of origin of 1192 accessions is unknown or not stated. For the latter 2 cases, the country of origin should be added by the help of the contributing institutes, if possible.

APPENDIX III (Continued)

6. The following work has been done in Gatersleben with computer-readable data on diskettes:
- (a) Up to the end of October 1985, the data of 25,949 accessions from 18 institutions in 14 countries have been combined into the EBDB.
 - (b) The data from diskettes received via the Nordic Gene Bank have been transformed into database structure as soon as they arrived, i.e. complete data from Czechoslovakia in August 1985, and data from the Nordic Gene Bank, France, Federal Republic of Germany (the first 4,816 accessions of 9,017), Hungary and Israel in October 1985. Due to limited time, the data of some collections having mainly collected material as well as most of the data received after the end of October 1985 have not yet been transformed.
 - (c) Clear duplicates (accessions having identical or similar accession names) have been marked in the EBDB.
 - (d) In all data received up to the end of October 1985, some standardization of descriptors has been made where possible. Special attention has been paid to the genebank identity (use of agreed acronyms), country of origin, and donor country. It seems to be impossible to standardize accession names.
 - (e) The names of institutions and persons mentioned in the original data (e.g. genebank identity, donor institute/person, collecting institute, breeder) and the abbreviations used by the contributing institutions have been compiled together with the addresses (requested from the contributing genebanks) as a basis for later standardization of such acronyms according to the ECP/GR Workshop on Exchange of Information, held at Raćzikow, Poland, in 1984. (Attempts for standardization and unification of acronyms have been made in 1984 and 1985 by IBPGR, ZIGuK, Polish Genebank and others but there are not yet internationally agreed acronyms for all institutes, and, therefore, a standardization of such names in the Gatersleben EBDB would be of a preliminary nature.)
 - (f) Botanical names have been unified as far as possible if delivered by the contributing institutions in any form; the spelling and author citation have been corrected.
7. In order to improve the "user-friendliness" of the EBDB and the EBL, the following work remains to be done:
- (a) The data in the EBL are:
 - PART 1: Named accessions (cultivars, old European landraces, breeder's material, etc). - These must be grouped by accession names, and in such a way that all duplicates appear as neighbouring lines (later, only the "best representative" of each duplicate group will be printed with references to the other duplicates).
 - PART 2: Collected material. - This should be arranged by countries, and, where possible, by provinces and locations within countries. For this purpose, a special review of available geographic information from the EBDB has to be made for each country in order to standardize geographic names in such a way that a sensible sorting sequence of this information would be possible.

APPENDIX III (Continued)

PART 3: Wild species. - These should be arranged by (1) species, and (2) country of origin.

- (b) Various indices that may help to improve the accessibility of information in the EBL should be created, e.g., an index of accessions having CI or PI numbers, HOR numbers; an index of scientific names (species, botanical varieties) with reference to accessions belonging to each taxon, etc. Such indices can be created from the EBDB using advanced database techniques after reviewing the existing data and further standardization of the descriptors involved in these indices.
- (c) Various appendices have to be created for the EBL, e.g. a list of institute acronyms appearing in the data (with addresses), a list of scientific names, a list of country and region abbreviations (for users not familiar with the codes).
- (d) Various statistics have to be derived from the EBDB in order to answer questions like "How many collected accessions originate from each country?" or "How many different named accessions are there?", i.e. to find out regions in Europe under- or over-represented in European genebanks with respect to collected material as well as cultivars.
- (e) Obvious errors in the origin countries have to be corrected, and lists of accessions extracted by country of origin have to be sent to institutions in these countries for further clarification of information. The delivering institutes have to be informed of all corrections and additions made in their data by the leading institute and other experts to allow them to improve their own files.
- (f) Clear duplicates have to be marked in the EBDB using EBL descriptors 69-71 on the basis of accession names, various numbers, etc. (cf. Appendix IV).
- (g) More descriptors have to be standardized. For some descriptors this may be a time-consuming task because transformation tables have to be created (e.g. for institute acronyms, botanical names).
 - Information on "other numbers" (including donor numbers) may be standardized (and in part be extracted from other descriptors, e.g., accession name) in order to find out more possible duplicates based on identical numbers. Initial steps in this direction have been made.
 - Standardization of geographical information (province/state, locality, latitude, longitude, etc.) will also be needed in order to get sensibly arranged data in printouts of collected material sorted by geographical origin.
 - Information on row numbers is "hidden" in the original data in various forms, e.g., it may be included in the scientific name (convar., var.), given in numbers (e.g. 2, 4, 6) given as "var. distichum", "var. polystichum", or "two-rowed", etc., or even hidden in the accession name.
- (h) All newly available barley passport data have to be included into the EBDB. Additional information from genebanks, corrections and deletions have to be entered into the country files.
- (i) A paper for the FAO/IBPGR Plant Genetic Resources Newsletter has to be prepared to alert potentially interested scientists of the existence and the possible services of the EBDB to genebanks and breeders.

APPENDIX IV

IDENTIFICATION OF DUPLICATES IN THE EDBD

For the designation of potential duplicate accessions in European barley collections on the basis of EEDB data, 3 descriptors were discussed and defined in May 1985. They are based on the EBL (European Barley List) numbers of the accessions, which are arbitrary unique numbers given to the accessions in the European Barley Data Base.

Descriptor No. 69: Duplicate grouping

Potential duplicates are denoted here arbitrarily with the EBL-No. of that accession of each "duplicate grouping" which has the lowest EBL number. This will be done in a first survey of data on the basis of specially sorted computerized information only (e.g. alphabetical list of accession names, of parts of the accession names, lists of PI, HOR, and other numbers, lists of accession names containing the same breeder's name, the same word, etc.).

Descriptor No. 70: Duplicate designated

Designated best representative of "duplicate grouping" by Barley Working Group experts. In the beginning this descriptor is identical with the EBL-No. of each record (default value). It will be replaced by EBL-No. of the best representative of the duplicate grouping (i.e. the "most original" material) after the expert's decision is made.

Descriptor No. 71: Type of duplicate

Based only on computerized information, relating to descriptor 69. The descriptor states are:

- 1 = Modern cultivar, duplication based on same name, or breeding line, duplication based on same line designation (true duplicates);
- 2 = Older cultivar (bred cultivar before about 1950, named landraces, etc.) with the same name (populations may have undergone some evolution during maintenance in genebanks and therefore may not be true duplicates);
- 3 = Other material, on the basis of same donor numbers, or same "other numbers" (except collection numbers, see state 4);
- 4 = Other material, on the basis of same collection numbers, (for the same expedition/collector);
- 5 = Particular cases (on the basis of other criteria). A special note should exist in some place.

APPENDIX IV (Continued)

The following example may illustrate the use of the descriptors above.

After searching through a specially sorted list of data (in this example, an alphabetically sorted list of accession names), the following potential duplicates have been found.

EBL Number	Holding Genebank	Origin Country	Accession Name	Duplicate Grouping (1)	Duplicate Grouping (2)	Best Representative	Type of Dupl.
30339	REGNGB	-	OPAL, ABED	00987	01399	30339	
16424	DDFGAT	DNK	Abed Opal	00987	01399	30339	
01399	CSKVURV	DNK	ABED OPAL	00987	01399	30339	
14343	HUNRCA	DNK	ABED OPAL YG 66	00987	14343	14343	
44996	GBRPBI	CSK	Opal	00987	00987	00987	
45407	GBRPBI	CSK	Opal	00987	00987	00987	
00987	CSKVURV	CSK	OPAL	00987	00987	00987	
03852	POLIHAR	CSK	OPAL	00987	00987	00987	
25173	DDFGAT	CSK	Opal	00987	00987	00987	
47987	NLDGBN	DNK	Opal	00987	01399	30339	
09469	DEUBGRC	DNK	OPAL	00987	01399	30339	
03851	POLIHAR	DNK	OPAL	00987	01399	30339	
45683	GBRPBI	DNK	Opal (Abed)	00987	01399	30339	
45699	GBRPBI	DNK	Opal (Abed)	00987	01399	30339	

On the basis of accession names only, all these accessions were suspected of being duplicates and, therefore, all were marked as belonging to the same "Duplicate Grouping" (1). The lowest EBL number within this group is 00987, and it is arbitrarily assigned as the number of the duplicate group. Consulting the breeder's names given and the country of origin (2), it was found that Opal cultivars had been bred in at least 2 countries, i.e. Czechoslovakia and Denmark (Abed). Therefore, the Opal cultivars form at least two distinct groups, and the Danish one receives a new duplicate group number. The 'Abed Opalyg 66' seems to be distinct from the other 'Abed Opal' accessions, and, therefore, it forms a third "group". For each of these groups, the barley experts could have designated an institute responsible for maintenance, i.e. the Nordic Gene Bank as representing Denmark in the ECP/GR to be responsible for 'Abed Opal' and the Czechoslovakian genebank for 'Opal'. 'Abed Opalyg 66' should be maintained in Hungary, and a safety duplicate should be sent from there to another European institution (if this is really something different from 'Abed Opal'). The last column in the above table tells that these duplicates have been detected on the basis of accession names which are cultivar names.

Other points

1. In identifying potential duplicates it is necessary to distinguish between "named accessions" (cultivars, breeder's lines, defined lines from landrace populations, etc.) - descriptor No. 71, states 1...3 - and "collected accessions" (landrace populations) - descriptor No. 71, state 4.
2. A prerequisite to identify potential duplicates within "named cultivars" is

APPENDIX IV (Continued)

the correctly written cultivar name. Therefore, the cooperating data bases (genebanks) should review all names of cultivars which originated in their country (EBL-descriptor 12) on the basis of the respective alphabetically sorted EBDB printouts with the help of their country's variety documentations. Evident errors in the variety names (misspellings) and in the country of origin (wrong or missing) should be corrected by the EBDB.

In cases where it is suspected that the same cultivar name was used for different cultivars the country of origin should be carefully checked by data bases (genebanks) which maintain it and by consulting the data base in the respective country. This may be necessary in only very rare cases.

3. Transliterations of cultivar names should be done using agreed rules and the letters of the English alphabet only. Special letters of some languages (e.g. German, Scandinavian languages) that are available on some computers and their printers may turn out to have the same ASCII code, as, e.g. a square bracket, and should therefore be avoided in international data exchange. Transliterations for Cyrillic or other non-Latin alphabets may also cause serious difficulties.
4. Regarding the correctness of designation of breeder's lines and defined lines from landrace populations, they can be checked only by original donor designations or the original donor, respectively.
5. The accession name may contain much more information than the pure cultivar name or breeder's line designation. Very often the breeder's name is given in full or abbreviated. It may contain also collection numbers or "Other Numbers" as USDA P.I. numbers and Gatersleben HOR numbers. Other information "hidden" in the accession name and potentially helpful in detecting duplicates is the row number of the spike, earliness, and other common words as parts of the accession names.
6. The identification of clear duplicates in accessions collected in the field (landrace populations) on the basis of identical collection numbers should never have the aim to reduce such duplicates in different genebanks. In the case of multiplication of such accessions at different places and/or by different persons unforeseen and unwanted selections can occur. If such an identification of duplicates is wanted it should be performed for practical reasons only in genebanks where the original sample is deposited.

APPENDIX V

LIST OF PASSPORT DESCRIPTORS TO BE REGISTERED IN THE EBDB

- 1.1 Accession number
 - * Accession name 1/
- 2.4 Country of collection or country where cultivar/variety was bred
- 1.2 Donor name
 - Donor person
 - Donor institute
- 1.3 Donor identification number
- 1.4 Other numbers associated with the accession
 - * Breeding firm/company 1/
- 1.5 Scientific name
 - Subspecies
 - Convarietas
 - Botanical varietas
- 2.11 Status of sample
- 2.1 Collector's number
- 2.2 Collecting institute
- 2.3 Date of collection of original sample
- 2.6 Location of collection site
- 2.7 Latitude
- 2.8 Longitude
 - * Year of release of the cultivar 2/
 - * Year of registration of the cultivar 2/

Numbers refer to IBPGR Barley Descriptors, where precise definition of the descriptor is given

* Descriptors not included in IBPGR Barley Descriptor list

*1/ Descriptors recommended by the Workshop on Exchange of Information, Radzikow, Poland

*2/ Descriptors recommended by the Barley Workshop

APPENDIX VI

LIST OF CHARACTERIZATION/EVALUATION DESCRIPTORS
TO BE REGISTERED IN THE EBDB

FIRST PRIORITY

It is the primary responsibility of the genebanks to observe or procure these data in the shortest term as possible:

- 4.1.1 Growth class (seasonality)
- 4.1.2 Plant height
- 4.2.1 Days to flower in relation to a standard
- 4.2.2 Row number/lateral florets
- 4.3.1 Kernel covering
- 6.3.1 1000 grain weight
 - * Resistance to lodging
 - * % of straw breakage
 - * % of straw necking

Diseases:

- 8.2.1 Puccinia striiformis
- 8.2.3 Puccinia hordei
- 8.2.4 Erysiphe graminis
- 8.2.5 Rhynchosporium secalis
- 8.2.7 Helminthosporium teres
- 8.4.2 Barley Yellow Mosaic Virus (BYMV)

Numbers refer to the IBPGR Barley Descriptors where precise definition of the descriptor is given.

* Definition as follows:

Resistance to lodging: the straw loosens from the soil, or more commonly the straw bends over. On a 1-9 scale.

% of straw breakage: the straw is broken in one or several places (%)

% of straw necking: the straw is broken just below the spike (%)

APPENDIX VI (Continued)

SECOND PRIORITY

Genebank to procure these data as soon as possible:

- * % Weight of kernel more than 2.2 mm of grade
- * % Weight of kernel more than 2.5 mm of grade

6.3.2. Percentage of protein content

Diseases:

- 8.2.6 Helminthosporium gramineum
- 8.2.8 H. sativum
 - * Septoria passerinii
- 8.2.9 Ustilago nuda
- 8.2.10 U. hordei
- 8.2.11 Fusarium spp.
- 8.4.1 Barley Yellow Dwarf Virus (BYDV)
- 8.4.3 Barley Stripe Mosaic Virus (BSMV)

THIRD PRIORITY

To provide when available and to encourage the record of these data:

- 6.3.3 Lysin/protein ratio
 - * Content in dry malt
- 7.5. Winter kill
- 7.6. Salinity
- 7.7. Low pH
- 7.8. Sprouting

Numbers refer to the IBPGR Barley Descriptors where precise definition of the descriptor is given

* Additional descriptors recommended by the Barley Workshop; explanations on how the data were recorded should be provided for content in dry malt

APPENDIX VII

RESULTS OF A SURVEY ON BREEDING INFORMATION NEEDS

The purpose of this survey was to assess the relation of breeders with genetic resources collections and breeding information needs in order to help the ECP/GR Barley Working Group to define a long-term strategy for the registration of data in the European Barley Data Base (EBDB).

One-hundred and fifty questionnaires, divided in two parts, were sent. Part I was requesting general information on the status of collections, the use of material by breeders for specific breeding purposes and the relation of the breeders with the genebanks. Results of these replies are summarized in tables 2 to 9. In Part II breeders were asked to rate the value first of individual descriptors registered into their national data base, this means of characters observed in climatic conditions similar to their breeding programmes, secondly of the same descriptors but registered into an European data base, this means that the observations of the characters may have been recorded in a very different environment. The descriptors were selected from the IBPGR Barley descriptor list as well as from the COMECON one. The ratings of these descriptors are provided in table 10 and table 11 show the 20 most important descriptors in national and international information systems according to the survey.

Table 1. Distribution of replies from breeders by country (survey parts I and II)

Country	Survey parts	
	I	II
Bulgaria	1	1
Belgium	-	1
Cyprus	1	1
Denmark	3	3
Finland	1	1
France	4	4
German Demo- cratic Republic	2	2
Greece	1	1
Hungary	-	-
Iceland	1	1
Ireland	2	2
Israel	1	-
Italy	-	-
Netherlands	2	2
Norway	4	4
Poland	2	2
Spain	4	2
Sweden	1	1
Syria (ICARDA)	3	3
UK	5	4
USA	3	3
Yugoslavia	1	1
Turkey	1	1
	—	—
TOTAL	43	40

APPENDIX VII (Continued)

Table 2. Size of breeders' collections (number of accessions)

Size	Number
0 to 100	2
100 to 500	14
500 to 1000	6
1000 to 5000	12
5000 to 10000	4
Over 10000	—
Number of replies	38

Table 3(a). Major source of disease resistance for individual breeding needs

Source	Number
Own breeding collection	15
Material from genebanks	22
Other *	17
Number of replies	54

* Usually material obtained by exchange with other breeders

Table 3(b). Status of the material used

Status of material	Number
Wild	5
Weedy	3
Primitive cultivar/landrace	18
Breeders' line	31
Advanced cultivar	24
Number of replies	81

APPENDIX VII (Continued)

Table 4(a). Major source of stress tolerance for individual breeding needs

Source	Number
Own breeding collection	20
Material from genebanks	13
Other *	14
	—
Number of replies	47

* Usually material obtained by exchange with other breeders

Table 4(b). Status of the material used

Status of material	Number
Wild	4
Weedy	2
Primitive cultivar/landrace	19
Breeders' line	25
Advanced cultivar	18
	—
Number of replies	68

Table 5(a). Major source of yield increase for individual breeding needs

Source	Number
Own breeding collection	24
Material from genebanks	7
Other *	13
	—
Number of replies	44

* Usually material obtained by exchange with other breeders

APPENDIX VII (Continued)

Table 5(b). Status of the material used

Status of material	Number
Wild	0
Weedy	0
Primitive cultivar/landrace	2
Breeders' line	24
Advanced cultivar	28
	—
Number of replies	54

Table 6. Breeders' appraisal on quantity of information available on samples in genebanks

Status of information	Number
More than sufficient	2
Sufficient	4
Just sufficient	9
Insufficient	21
Quite insufficient	2
	—
Number of replies	38

Table 7. Breeders' appraisal on quality of information available on samples in genebanks

Status of information	Number
Excellent	0
Good	4
Adequate	16
Inadequate	14
Quite inadequate	2
	—
Number of replies	36

APPENDIX VII (Continued)

Table 8. Global importance attributed to passport, characterization and evaluation data in national and international crop data bases *

Type of data	Local/national importance (mean)	International importance (mean)	Average number of replies
Passport data	1.80	2.20	27
Characterization data	2.20	2.30	27
Evaluation data	2.50	2.00	27

* (Ratings 1 to 3, with 3 = most important)

Table 9. Level of precision considered by breeders as important for passport data

Type of passport data	Number
Only country of origin	4
The above + precise site of collection including latitude and longitude	3
The above plus altitude	10
The above plus climatic data	8
The above plus ecological conditions	21
	—
Number of replies	46

APPENDIX VII (Continued)

Table 10. Ratings of individual barley descriptors *

Descriptor	Local importance (mean)	Importance in an international data base	Number of replies (mean)
STATUS OF THE SAMPLE	6.8	6.9	32
METHOD OF BREEDING (PEDIGREE)	6.9	7.0	32
LOCAL/VERNACULAR NAME	5.5	5.8	34
COUNTRY OF ORIGIN	7.0	7.5	34
PROVINCE/STATE	5.1	6.0	34
LOCATION OF COLLECTION SITE	5.4	5.8	34
LATITUDE AND LONGITUDE	5.7	6.3	34
ALTITUDE	5.2	6.2	34
COUNTRY OF CHARACTERIZATION AND EVALUATION	-	7.8	30
SITE	-	6.1	34
NAME OF EVALUATOR	-	4.1	34
SOWING DATE	-	6.2	34
HARVEST DATE	-	6.2	34
GROWTH CLASS/HABIT	8.6	8.6	35
PLANT HEIGHT	6.9	6.5	35
DAYS TO FLOWER	6.9	6.4	34
ROW NUMBER/SPIKE TYPE	7.1	7.5	34
SPIKE DENSITY	5.0	5.0	35
NUMBER OF SPIKELET GROUPS/SPIKE	4.8	4.8	33
SPIKE AWNEDNESS/HOODEDNESS	5.8	6.0	34
AWN ROUGHNESS	4.2	4.4	33
LENGTH OF RACHILLA HAIRS	3.5	3.8	33
KERNEL COVERING	6.7	6.7	32
LEMMA COLOUR	4.0	4.3	34
GRAIN (PERICARP COLOUR)	4.8	4.9	34
1,000 GRAIN WEIGHT	7.8	6.9	33
GRAIN YIELD	7.9	6.7	33
PERCENTAGE PROTEIN CONTENT	6.4	6.0	33
LYSINE/PROTEIN RATIO	6.1	6.1	32
CONTENT IN DRY MALT	5.8	5.8	31
LOW TEMP.DAMAGE/FROST RESISTANCE	7.6	8.0	33
HIGH TEMP./DROUGHT RESISTANCE	5.5	7.0	33
HIGH SOIL MOISTURE RESISTANCE	5.6	6.4	23
WINTER KILL/HARDINESS	7.6	8.1	33
SALINITY	4.0	6.2	32
LOW pH	4.5	6.3	32
SPROUTING	6.0	6.5	32
RESISTANCE TO LODGING	8.5	7.9	32
RESISTANCE TO GRAIN SHATTERING	7.3	7.5	32

* (Ratings 1 to 9, with 9 = most important)

APPENDIX VII (Continued)

Table 10. Ratings of individual barley descriptors (Continued) *

Descriptor	Local Importance (mean)	Importance in an international data base	Number of replies (mean)
YELLOW RUST <u>Puccinia striiformis</u>	5.4	7.7	29
BLACK RUST <u>Puccinia graminis</u>	3.2	6.5	29
DWARF LEAF RUST <u>Puccinia hordei</u>	6.9	8.1	30
POWDERY MILDEW <u>Erysiphe graminis</u>	8.5	8.5	30
LEAF BLOTCH <u>Rhynchosporium secalis</u>	7.5	7.9	31
LEAF STRIPE DISEASE <u>Helminthosporium gramineum</u>	5.9	7.0	29
NET BLOTCH <u>Helminthosporium teres</u>	7.2	7.7	29
SPOT BLOTCH <u>Helminthosporium sativum</u>	5.2	6.8	28
SEPTORIA LEAF AND GLUME BLOTCH <u>Septoria passerinii</u>	4.0	5.6	26
LOOSE SMUT <u>Ustilago nuda</u>	5.3	6.2	26
COVERED SMUT <u>Ustilago hordei</u>	3.9	5.9	27
BLACK SMUT <u>Ustilago nigra</u>	2.9	4.9	25
ROOT ROT <u>Fusarium</u> spp.	4.5	5.8	30
ERGOT <u>Claviceps purpurea</u>	3.0	4.9	30
BARLEY YELLOW DWARF VIRUS (BYDV)	6.1	7.5	31
BARLEY YELLOW MOSAIC VIRUS (BYMV)	5.6	6.7	31
BARLEY STRIPE MOSAIC VIRUS (BSMV)	3.9	6.0	28
Other descriptors required		Number of times Independently cited	Mean rating
"SPECIAL" CHARACTERS OF ACCESSION		6	9.0
DATA ON WHERE MATERIAL IS AVAILABLE		6	9.0
PARENTS AND GRAND PARENTS (PEDIGREE)		5	7.0
DWARFING GENES		2	9.0
MILDEW RESISTANCE GENES		2	9.0
BROWN RUST		2	9.0
NEMATODE RESISTANCE		1	9.0
GRAIN SPLITTING		1	9.0
TILLERING CAPACITY		1	9.0
LEAFINESS (FORAGES/GRAIN TYPES)		1	9.0
PERICARP EXPOSURE		1	7.0
REASON FOR KEEPING ACCESSION		1	7.0
PSEUDOCERCOSPORELLA h.		1	
GAENNOMYCES gr.		1	
ASCOCHYTA		1	
PROTEIN ELECTROPHORESIS		1	9.0
AMYLASE ACTIVITY		1	7.0

* (Ratings 1 to 9, with 9 = most important)

APPENDIX VII (Continued)

Table II. Twenty most important barley descriptors in national and international information systems according to survey.

Rank	National importance		International importance	
	Descriptors	Mean rating	Descriptors	Mean rating
1	Growth class/habit	8.6	Growth class/habit	8.6
2	Resistance to lodging	8.5	Powdery mildew	8.5
3	Powdery mildew	8.5	Winter kill/hardiness	8.1
4	Grain yield	7.9	Dwarf leaf rust	8.1
5	1000 Grain weight	7.8	Low temperature resistance	8.0
6	Winter kill/hardiness	7.6	Resistance to lodging	7.9
7	Low temperature resistance	7.6	Leaf blotch	7.9
8	Leaf blotch	7.5	Country of characterization/evaluation	7.8
9	Resistance to grain shattering	7.3	Net blotch	7.7
10	Net blotch	7.2	Yellow rust	7.7
11	Row number spike/type	7.1	Barley yellow dwarf virus	7.5
12	Country of origin	7.0	Resistance to grain shattering	7.5
13	Plant height	6.9	Leaf stripe disease	7.0
14	Dwarf leaf rust	6.9	Method of breeding	7.0
15	Days to flower	6.9	High temperature/drought resistance	7.0
16	Pedigree	6.9	1000 grain weight	6.9
17	Status of sample	6.8	Status of sample	6.9
18	Kernel covering	6.7	Spot blotch	6.8
19	Percentage protein	6.4	Grain yield	6.7
20	Lysine/protein ratio	6.1	Barley yellow dwarf mosaic virus	6.7